THE ROLE OF TRAINEE REACTIONS IN ONLINE TRAINING

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I. Introduction

U.S. organizations make significant investments in the training and development of their employees. The American Society of Training and Development (ASTD) reports training expenditures averaged 2.2% of payroll for organizations in their 2002 benchmarking study (Sugrue, 2003). Employers expect to spend even more on training in the future. This study reported a growth in training expenditures from an average of $734 per employee in 2001 to an average of $826 in 2002.

Despite extensive training investments, few organizations take the step of evaluating the effectiveness of training. Further, when measures of effectiveness are taken, organizations typically record the measures that are most easily obtained. Immediate post-training participant reactions tend to be the most common evaluation method because they require little time and effort to collect (Tannenbaum & Woods, 1992). ASTD’s benchmarking report found 75% of organizations measured trainee reactions, while only 41% of organizations measured trainee learning to evaluate the effectiveness of courses. Twitchell, Holton and Troutt (2000) found 73% of the technical training courses in their study were evaluated with a measurement of trainee reactions, while only 47% of courses were evaluated with a measurement of trainee learning. These statistics suggest that thorough training evaluation is not always a priority for organizations.
Why Evaluate Training?

Training is effective when the trainees or the organization derive some benefit from the training. Training evaluation is the process of collecting the outcomes needed to determine if the training is effective (Noe, 2002). Training evaluation serves four main purposes for organizations.

First, training evaluation serves the purpose of demonstrating the value or utility of a training course (Hamblin, 1974). Training evaluation is an important task because training functions are often competing for scarce organizational resources (Phillips & Phillips, 2001). The ability to show the effectiveness or the utility of a training course can help gain support for the training function when it is time to determine organizational budget allocations. Further, evaluation data can help demonstrate that the training function contributes to the organization's objectives and goals.

Second, organizations can use data collected through evaluation to make decisions about whether to continue or discontinue a training course (Kraiger, 2002). Consider the following scenario as an example. An organization creates a training course for employees on new software purchased by the company. Through the evaluation process, the organization can determine if the course is effective and useful for the participants to learn the new software. The evaluation process reveals that the training course was not useful because the employees learned how to use the new software more easily by just exploring the software at their workstations. Based on this information, the organization decides to discontinue offering the course. In this case, even though the
organization already invested time and money into developing the course, discontinuing the course avoids future costs such as the trainer’s and training participant's time.

Third, feedback collected through the evaluation process can be used to revise and improve the training (Kraiger, 2002). If the training evaluation process can detect problems with a course, training designers may modify the course so that it is more effective the next time it is offered. For example, consider a supervisory skills course that includes a video that demonstrates how to address a difficult employee. An evaluation of the training course could find that the participants were not engaged by the video. Further, a post-test may reveal that the participants did not generally recall the information presented in the video. Based on this information, the training designer might decide to modify the course by adding a follow-up discussion or a role-play activity to support the delivery of the information from the video. Taking this step to revise the training could result in a more effective training course.

Finally, evidence of training effectiveness can also help market training courses to others in the organization to increase training enrollments (Kraiger, 2002). If an organization has already incurred the expense of developing a training course, further enrollment in the course could help improve the return on the investment in course development. If an organization receives positive feedback from course participants on the utility of a course, the training department can use that feedback on marketing materials to help "sell" the course to other organizational members.

The use of evaluation may seem only important if a course is going to be offered on multiple occasions, but this is not necessarily true. Evaluation of training courses is
important even if a course is only offered once. Feedback from previous training courses can help in the design of future courses. If organizational trainers identify effective instructional practices through one course, these practices may be applied in the development of a future course. Further, success in one course may support the marketing of a different course. For example, if training evaluation finds value in a training course purchased from a certain vendor, trainees may be more willing to enroll in future courses offered through the same vendor.

Based on the varying uses of training evaluation data, it seems clear that organizations should pursue training evaluation. It is logical for an organization to expend some time and effort to evaluate the effectiveness of a training course, just as an organization evaluates the effectiveness of other investment decisions. However, as discussed earlier, many organizations still fail to fully evaluate training.

Why Organizations Fail to Evaluate Training

Given the potential value of training evaluation, it is unfortunate that organizations fail to pursue formal evaluations. There are three main obstacles that prevent organizations from evaluating training.

First, society views education is a good thing, and therefore, any training is beneficial (Toplis, 1992). Because of this belief, organizations may hesitate to invest the time and effort into training evaluation. There seems to be a strong sense that training is always a "good thing" in organizations and this enforces the belief that evaluation is not always necessary (Lewis & Thornhill, 1994). As pointed out by Kraiger (2002), "if there
is an ongoing commitment to employee training and development by the organization, no news may be good news when it comes to documenting training impact (p. 340)."

Second, there is a lack of expertise in evaluation methodology and a lack of understanding of the value of measuring the effectiveness of training (Twitchell et al., 2000). Training practitioners for the most part have failed to embrace academic research on training evaluation. A disconnect exists between training evaluation research and the actual practice of training evaluation (Blanchard, Thacker & Way, 2000). For example, even though researchers often discount the value of trainee reactions, they continue to be the most common method of evaluation in organizations.

Finally, many organizations are unwilling to invest the time and resources into training evaluation (Twitchell et al., 2000). This is usually due to lack of support by top management (Goldstein & Ford, 2002). While most organizations recognize the value in evaluating other aspects of business practice, this same recognition is not usually applied to training.

Because organizations continue to rely upon trainee reactions, academic research should pursue opportunities to explore the utility of the measure. Researchers have yet to conclusively determine if trainee reactions play a role in contributing to the effectiveness of training. Further, research exploring the utility of trainee reactions has taken a limited view by only attempting to demonstrate utility by linking positive trainee reactions to improved learning outcomes. Because trainee reactions are so easy to obtain, it is likely that organizations will continue to collect them. Thus, it is clear they need to find ways
to maximize the value of the trainee reaction information. The goal of this study is to explore the role of trainee reactions and the utility of this measure of effectiveness.

Online Training Courses

This study will examine trainee reactions in an online training environment. There are many ways technology can deliver training. Online or web-based training differs from other forms of computer-based training such as training delivered via a CD-ROM or DVD. Online training uses a variety of learner-controlled interactive tools such as customized desktops, drop down menus and different media streams such as video or audio (Wasserman, Orvis, & Barry, 2002). Currently there is a lack of standardized terminology to describe technology delivered distance-learning courses (Salas et al., 2002). Terms such as online training, e-learning and web-based training are commonly used to describe training courses delivered via the Internet using web-based browsers. Hereafter, I will refer to this type of training course as online training.

The Growth of Online Training

The use of online training is a growing practice in organizations with the promise of lower distribution costs for just-in-time training at anytime to any location (Simmons, 2002). ASTD’s study found that organizations delivered 15.4% of their training using technology in 2002 compared to only 10.5% in 2001 (Sugrue, 2003). Further, the use of technologies such as online training will likely grow in popularity as they allow organizations to meet their immediate and strategic needs for a flexible, well-trained
workforce (Kosarzycki et al., 2002). In fact, analysts forecast that the use of online training or e-learning in organizations will grow on average 11% per year through the year 2007 (Britt, 2004). This growth is due to the benefits organizations expect from utilizing online training courses. The following section describes six ways an organization may benefit from the online training option.

First, online training can ensure consistent delivery of training content. This might be of particular importance if an organization needs employees to get the exact same information on a topic. If more than one instructor facilitates a training course, it is more likely that the training content provided might vary. For example, many organizations have found online training as a solution to problems in delivering training on product quality issues that require consistency (Burns, 2005).

Second, templates and other technology allow for quicker development of online training compared to other training delivery methods (Van Dam, 2005). Once an organization has an online training course template developed, they can quickly add new training courses by plugging new training content into the template. Once a training course is posted on the Internet or a company's Intranet, it is immediately available for access by employees. This is a significant convenience for organizations with geographically dispersed employees.

Third, online training provides more convenience to learners because it allows them to access the training at any time and from any location. This is much more flexible than classroom training that is often held only at specific times and locations. Trainees may work at their own pace and save time in their schedules by not having to travel to
and from training. Further, employees that have challenging work schedules, such as those employees who travel frequently, can complete the training in short segments when they find time. Experts predict that the use of mobile technology will expand the use of online training (Welsh et al., 2003). For example, a consultant may find time to complete a segment of a training course while waiting for a flight at an airport by using a laptop computer with an Internet connection provided by the airport.

Fourth, many organizations move to online training due to the potential cost savings. According to a survey by Managing Training and Development (2005), implementation of an online training option is the top method training departments are using to cut costs. While it may be costly to develop online training due to the investment in technology, the use of online training can reduce costs for training from several perspectives. Technology is believed to be able to reduce training costs particularly if there are a large number of employees who must take the training and those employees are geographically dispersed (Welsh et al., 2003). Cost savings are found when travel is eliminated and the course can be accessed many times without any additional costs. Once an online training course is developed, a facilitator is not required each time the course is offered.

Fifth, research by the Gartner Group projects online training usage to grow significantly over the next five years due to the need to support compliance initiatives and other types of government regulations (Eid, 2004). For example, in 2003 when health care providers were required to train all of their employees in new privacy regulations under the Health Insurance Portability and Protection Act (HIPPA), many embraced
online training as a method to deliver the training in a cost effective manner (Gilette, 2003). In addition to the cost savings, many organizations used online training for HIPPA compliance because it could also track who completed the required training. Organizations are likely to turn to online training courses for many other compliance needs such as ethics training required by the Sarbanes-Oxley Act and health and safety training required by the Occupational Health and Safety Act.

Finally, online training may also grow in popularity as more trainees find they enjoy the training, and as a result, increase enrollments. Some research has indicated that learners may prefer online training to other delivery methods because they feel they may learn more and they do so in less time (Kulik, 1994).

Why Study Reactions in an Online Environment?

The projected growth of online training use creates an interest in examining factors that may contribute to the effectiveness of online training courses. Further, trainee reactions may play a more significant role in the effectiveness of training in an online environment compared to other delivery methods due to the structure of the learning environment. Online training has two specific characteristics, learner control and the absence of human interaction, that create a learning environment in which the trainee’s reaction to the training may more significantly impact their learning outcomes.

In an online training course, learners may have control over the pace of the course, the sequence of the training, or over the content they choose to explore in the training (Milheim & Martin, 1991). A meta-analysis examining moderating variables in
the relationship between trainee reactions and learning suggested that when learner control is high, a stronger relationship exists between trainee reactions and cognitive learning outcomes (Sitzmann et al., 2003). This may be true because learner control gives the trainee the option to complete only part of the course or drop out of the course. In fact, drop out rates for online training courses are one of the biggest problems facing organizations when implementing online training (Frankola, 2001). In contrast, most trainees complete instructor-led classroom courses even if they are not satisfied with the course. In an instructor-led classroom course, participants have usually set aside a specific time frame to participate in the training and have possibly traveled to the training. Also, because traditional classroom training is presented in a group setting, parts of training cannot typically be skipped.

Another important difference in the online training environment is the lack of instructor-led interaction (Brown & Ford, 2002). The trainer or instructor plays an important role in a typical training course. An expert trainer can improve the learning environment through assessing trainees’ interest and stimulating or maintaining trainees’ level of motivation during a training course (Salas et al., 1999). Sitzmann et al. (2003) reported in their meta-analysis that the relationship between reactions and learning is stronger when there is little human interaction in training. Further, an analysis of the dimensions of trainee reactions found that satisfaction with the instructor carries great weight in trainees’ overall satisfaction with training (Morgan & Casper, 2000). This finding suggests trainees value the guidance provided by an instructor. Without an instructor, trainees are left on their own to maneuver through an online training course. If
they are not able to do so successfully, they may not learn as much from the course. Therefore, in an online training course that lacks instructor interaction, a positive reaction to the training course may be important in order for learning to occur.

These differences create a need to examine the role of trainee reactions in online training courses. Understanding the importance of trainee reactions in online training courses will provide training designers direction in designing courses that may lead to better learning outcomes.
II. Examining the Utility of Trainee Reactions

As noted earlier, trainee reactions are the most common method of evaluation currently used by organizations. However, research has failed to find much utility in this measure of effectiveness. Most research has attempted to demonstrate the utility of trainee reactions through finding a relationship between trainee reactions and learning outcomes. Here I will review how reactions are currently modeled in the evaluation literature and examine specifically how trainee reactions are related to learning outcomes.

Training Evaluation Model

The Purpose of Evaluation

Training evaluation may be either formative or summative in nature. Training evaluation serves a formative purpose when information gathered is used to improve the course. Formative evaluation may take place throughout the development of a particular instructional course (Brown & Gerhardt, 2002). That is, training designers may collect feedback on a training course at various stages of the creation of the course. For example, before making a course available to the entire organization, training designers may create a "pilot" version of the training course to deliver to a small number of participants. Evaluation measures collected from the pilot course that are used to improve the course are considered formative evaluation measures. Training evaluation is used for a summative purpose when the information gathered is used for decision-making
and to determine if the training course was effective (Lee and Pershing, 1999).

Summative evaluation is completed after the training has been implemented.

Formative evaluation is considered to be of significant importance in training that uses multi-media delivery such as online training (Tessmer, 1995/1996). The multi-media capabilities of online training technology provide many instructional options. For example, training designers may incorporate a variety of features such as video, audio, interactive quizzes, simulations and collaborative learning options (i.e. "chat" rooms or discussion boards). Also, using technology can provide challenges such as user system capabilities and bandwidth availability. Due to these instructional capabilities and the complexity of using technology in training, formative evaluation is important to determine the most effective training design. Online training is also conducive to formative evaluation because it is possible and common to develop a pilot of a training course that can be given to trainees to get feedback for improvement.

The Outcomes of Evaluation

The most well-known model of training evaluation was set forth by Donald Kirkpatrick more than forty years ago (Kirkpatrick, 1959a; 1959b; 1960a; 1960b). In this series of articles, Kirkpatrick presented four levels of evaluation: reaction, learning, behavior and results. Kirkpatrick suggested that with each progressive level, evaluation becomes more difficult, but more useful information is obtained (Kirkpatrick, 1998).

The reaction level was simply defined as “how well the trainees liked a particular training course. (Kirkpatrick, 1959a, p. 4).” While Kirkpatrick acknowledged that this
initial level of evaluation does not provide any measure of learning, a more favorable reaction may lead trainees to pay better attention during the training, resulting in greater learning. Information obtained from reactions about the training may also lead to decisions on future training activities. Measuring trainee reactions provides suggestions for improvement, provides quantifiable information for training designers evaluating the course, and conveys to trainees the value of their input (Kirkpatrick, 1998).

Kirkpatrick defines the learning level of evaluation as the evaluation of principles, facts, and techniques understood and absorbed by the trainees (1959b). Kraiger, Ford and Salas (1993) provide a theoretical framework to define learning outcomes. Their framework posits learning as a multi-dimensional construct that includes cognitive, skill-based outcomes and affective outcomes. Cognitive learning outcomes include changes in declarative or verbal knowledge, changes in knowledge organization, and the development of cognitive strategies for accessing and applying knowledge. Skill-based learning outcomes are those that are concerned with the development of technical or motor skills and are demonstrated by compilation and automaticity. Compilation is the process of proceduralizing steps and automatically grouping steps into a more complex production. Automaticity means accomplishing tasks without conscious cognitive effort in a fluid manner. Finally, affective outcomes include changes in attitudes, motivation and goals that are relative to the objectives of the training course.

The third level, behavior, refers to the transfer of training to behavior on the job (Kirkpatrick, 1960a). This level of measurement looks at whether or not trainees apply the knowledge or skills they learned during the training course back in their work setting.
This is an important measurement because organizations typically offer training to their employees with the intention that the employees will actually use the training on the job. Organizations should not assume that performance of a skill during a training course always results in similar behavior in the work setting (Goldstein, 2001). There are many reasons that training may not transfer to the work setting. Noe (2002) outlines three main obstacles to transfer of training: work conditions, lack of peer support and lack of management support. Working conditions include aspects such as time pressures or inadequate equipment. Lack of peer support may lead to trainees being discouraged to use the new skill or language. Finally, managers may not reinforce training or provide opportunities to use new knowledge or skills. Due to these and other obstacles, it is important for organizations to evaluate the behavior level to determine if transfer of training has occurred.

Finally, the fourth level, results, refers to the evaluation of a training course in terms of the results desired. That is, evaluating the organizational results that are obtained by the training course (Kirkpatrick, 1960b). Organizational results are any number of outcomes that the organization feels are an indicator of success. These may include results such as increased sales revenues, cost savings, increased productivity, increased customer retention or reduced employee turnover. The result measured, however, should correspond with the training content. For example, a training course for sales representatives may examine the organization's sales revenues to determine if the training course delivered results.
All four levels of evaluation may be useful for both formative and summative purposes. The first two levels of reactions and learning focus on the learning environment or experience and are captured at the close of training in the training setting by the training facilitator. In contrast, the next two levels of behavior and results focus on the transfer of training to the work environment, are captured in the work setting and require management involvement. As such, the first two levels are the most often examined by trainers and researchers because they are more immediate and often easier to measure. As mentioned earlier, the first level of trainee reactions is by far the most popular measure for those organizations that evaluate training. Therefore, this study will focus on exploring the utility of the reactions measure.

**Research Examining Reactions and Learning**

One path research has taken to demonstrate the utility of the reaction measure is to examine the relationship between trainee reactions and learning outcomes. A relationship between positive reactions and improved learning outcomes implies a value in measuring training reactions. Logic suggests that a relationship between trainees’ reactions to the course and the actual learning outcomes is plausible. Reactions can play an important role in building interest and attention during the training (Patrick, 1992). A more favorable reaction may lead to more engagement, which in turn may lead to increased learning. Hamblin (1974) suggests that learning may depend on reactions because trainees must react favorably to training in order for learning to occur. That is, they do not necessarily need to like the training, but their reaction should be compatible
with learning objectives. At the very least, trainees should be receptive to learning. However, Kirkpatrick’s model is often criticized because the implied causal relationship among the four levels has not been supported in research on training evaluation (Alliger & Janek, 1989; Holton, 1996). Research on the relationship between reactions and learning has produced mixed findings.

Research Finding No Relationship Between Reactions and Learning

Noe and Schmitt (1986) examined the role of reactions in a study that hypothesized a causal relationship between reactions to training and learning outcomes. The subjects were enrolled in a training course for school principals. The study found only a weak correlation between reactions and learning (.18).

Alliger and Janek (1989) reviewed twelve research articles reporting 26 correlations between Kirkpatrick’s levels. They found slight correlations between the levels with only a $r=.07$ correlation between reactions and learning. Although this meta-analysis is limited by a small sample size, it provided little support for the relationship between reactions and learning.

Dixon (1990) examined the relationship between reactions and post-test scores for three training courses for a new manufacturing process. Reactions were measured based on trainee perceptions of course relevance, learning, enjoyment, instructor qualification, instructor skill, instructor knowledge and instructor preparation. In this study of 1,200 trainees at one employer, correlations between reaction dimensions and post-test scores were not significant in any of the three courses.
Warr and Bunce (1995) examined trainee reactions in an open learning environment where trainees worked on their own to learn the material. They measured three dimensions of reactions: a) enjoyment, b) usefulness and c) difficulty. The study reported a positive correlation between learning and the reactions of enjoyment (.10) and usefulness (.04), but these correlations were not statistically significant. They also found a negative correlation between the reaction of perceived difficulty and learning (-.14), but again, this correlation was not significant.

Research Finding a Relationship Between Reactions and Learning

Numerous studies have found a significant relationship between reactions and learning. The following section reviews twelve studies, including two meta-analyses, supporting this relationship. Six of these studies were conducted in an online training environment.

Clement (1982) investigated the relationships between the levels of evaluation using first-level supervisors from a state government agency participating in a supervisory skills training course. Regression analysis examined the relationship between trainee reactions to the course and a post-training measure of declarative knowledge. Results indicated that trainee reactions were positively related to learning ($\beta=.50, p<.05$).

A meta-analysis by Alliger et al. (1997) examined the results of 34 studies that yielded 115 correlations among the four levels of training evaluation. The researchers augmented Kirkpatrick’s taxonomy by further dividing reactions into affective reactions
and utility judgments. Affective reactions reflect how much the trainees liked or enjoyed the training. Utility judgments reflect the perceived usefulness of the training. Utility reactions had a significant correlation with learning ($r=.26$). Reaction measures that combined affective and utility measures also correlated significantly with learning ($r = .14$).

Warr, Allen and Birdi (1999) examined the reactions and learning gains of 123 technicians in a training course for diagnostic equipment at motor-vehicle dealerships. The authors examined four dimensions of reactions to the training course; enjoyment, perceived usefulness, perceived difficulty and motivation to transfer. Reactions of enjoyment, perceived usefulness and motivation to transfer were all positively linked to positive learning outcomes ($r = .30$, .49 and .45 respectively, $p<.001$), and the reaction of greater perceived difficulty was associated with poorer learning outcomes ($r = -.43$ $p<.001$). The authors speculated that the links between reactions and learning were stronger than in past research because of the differentiated indicators of reactions.

Inman, Kerwin and Mayes (1999) examined student learning in community college distance learning courses using telecourse videos. A total of 334 students in six different courses participated in the study. The researchers reported student ratings of the course instructor ($b=.25$, $p<.02$) and the course materials ($b = .39$, $p<.001$) predicted learning in the course.

Tracey et al. (2001) tested a model of training effectiveness that included an examination of the relationship between trainee reactions and learning. The study involved 420 hotel managers participating in a basic managerial skills training course.
Reactions to the training course were measured in the two dimensions suggested by Alliger et al.'s (1997) meta-analysis; affective reactions and utility reactions. Learning was measured through a post-training test that measured declarative knowledge and also the trainee’s ability to apply course content to situations on-the-job (application-based knowledge). A correlation analysis did not find a significant relationship between reactions and declarative knowledge (-.15 affective and .09 utility). However, both affective and utility reactions were correlated with application-based knowledge (.40, .44 respectively, p<.05). The authors tested their overall model using LISREL. The model examined only the relationship between utility reactions and declarative knowledge and found moderate support for the relationship (.19, p<.10).

Leach and Liu (2003) examined the relationships between Kirkpatrick's levels of evaluation in a sales training course in the life insurance industry. Among other findings, they reported a positive relationship between trainee reactions to the training and perceived levels of knowledge acquisition ($\beta=.42$, p<.01).

A study examining the role of trainee reactions in a training course for automotive technicians also found a relationship between reactions and learning. Tan, Hall & Boyce (2003) found that both affective and utility reactions predicted learning in this environment. A regression analysis found that positive affect toward the course predicted learning ($\beta=.30$, p<.01). The study reported that utility reactions they categorized as "Understand" ($\beta=.27$, p<.05) and "Improves" ($\beta=.22$, p<.05) predicted learning. The Understand sub-scale indicated the degree to which the trainee believed the training course helped them to understand the course material. The Improves sub-scaled
indicated the degree to which the trainee believed the training would help them improve their work. Another interesting finding of this study was that negative affect also predicted learning ($\beta = .41, p < .01$). That is, those who disliked the course also learned more. The authors suggested that this might have occurred due to a positive correlation between pre-training knowledge and negative affect. They speculated that the trainees already knowledgeable in the topic evaluated the training more harshly due to higher expectations.

Sitzmann et al. (2003) examined 33 studies in a meta-analysis of the relationship between trainee reactions and learning outcomes. Reactions were coded in the categories of affective, utility and overall reactions similar to the Alliger et al. (1997) study. Following the model set forth by Kraiger, Ford & Salas (1993), they also examined learning outcomes in different dimensions including cognitive, skill acquisition and self-efficacy. Among other findings, this meta-analysis reported stronger correlations between overall reactions and learning outcomes than previous meta-analyses (i.e. Alliger et al., 1997). They reported a mean corrected correlation between overall reactions and cognitive outcomes of .27 and between overall reactions and skill acquisition of .20.

**Relationship of Reactions and Learning in Online Training.** Several studies of online training suggest a relationship between reactions and learning. Kettanurak et al. (2001) examined the role of reactions in a laboratory controlled research study where participants completed a training course on how to use multimedia technology. They measured participant reactions as a post-training attitude with six dimensions including 1) satisfaction with user control, 2) satisfaction with course content, 3) satisfaction with
format, 4) satisfaction with feedback, 5) perceived ease of use and 6) the degree to which the course motivated learners. Overall, they found positive correlational relationships between each of their measures of user attitude and learning. They reported a correlation of .155 for satisfaction with format (p<.05), .129 for satisfaction with user control (p<.10), .158 for satisfaction with feedback (p<.05), and .139 for the degree to which the course motivated learners (p<.05). The correlations for satisfaction with course content (.08) and perceived ease of use (.097), however, were not significant. Overall satisfaction with the course was also related to learning in this study (r = .168, p<.05).

Arbaugh and Duray (2001) examined factors influencing participant satisfaction in an online MBA course. While not the central focus of their study, the researchers reported a statistically significant correlation between perceived learning and a positive reaction to the course. In this study, they looked at two dimensions of reaction; satisfaction with the course and satisfaction with the delivery medium reporting correlations of .73 and .29 respectively (p<.05). Arbaugh (2002) replicated these results in another study examining the effects of technology on the delivery of a web-based MBA course. The author found a correlation of .68 (p< .05) between satisfaction with the course and learning, and a correlation of .30 (p< .05 ) between satisfaction with the delivery medium and learning.

Wasserman, et al. (2002), found moderate support for a relationship between reactions and learning in a study of online training. This study examined the impact of trainee reactions on the relationship between learner control choices and learning outcomes. A post-hoc regression analysis found a significant effect of overall course
satisfaction on learning ($\beta=.135, p<.05$) after controlling for the effects of grade point average.

Fisher, Wasserman and Orvis (2004) examined various predictors of learning outcomes in an online multi-media leadership skills course. The study examined the relationship between overall affective reactions to the training course and a cognitive outcome measured with a multiple-choice test. The study found training satisfaction was a significant predictor of knowledge acquisition ($\beta=.122, p<.05$). Brown (forthcoming, 2005) examined the role of trainee reactions in different multi-media environments including audio supplemented with print, video, and intranet delivered. Across all media, overall satisfaction predicted learning ($\beta=.27, p<.01$).

**Implications for the Utility of Trainee Reactions**

In summary, the bulk of the research on the relationship between reactions and learning supports the logical assumption that reactions and learning are related. All of the studies conducted in an online environment found a relationship between reactions and learning. However, some of the studies did not find a relationship between reactions and learning. The measurement of the reactions construct seems to be the primary difference in finding the relationship. Most of the studies described earlier that examined reactions as a multi-dimensional construct found a link to learning (e.g. Alliger et al., 1997; Warr et al., 1999; Tracey et al., 2001; Tan, Hall & Boyce, 2003, Kettanurak et al., 2001). Whereas, some of the studies that did not find a relationship looked at reactions as a one-dimensional construct (e.g. Noe et al., 1986; Alliger et al., 1989). The wide
variety of research methodologies may have also contributed to the mixed findings. For example, these studies examine different types of training programs that include varying content and training design. Also, every study used a unique measure of trainee reactions and learning outcomes.

These mixed findings also question the utility of the trainee reaction measure. If positive reactions do not always improve learning outcomes, then are they a useful measure? The present study will suggest that reactions have utility beyond the simple linear relationship to learning outcomes. By examining the relationship between trainee reactions and other variables beyond learning outcomes, this study will attempt to explain why positive trainee reactions are important to the effectiveness of training.

This study proposes a model to explain the role trainee reactions play in contributing to the effectiveness of training, particularly in the online learning environment. This study suggests that positive reactions are important because they interact with trainee motivation to determine the amount of effort that trainees put forth in completing a training course. Further, positive trainee reactions are needed to ensure future course enrollments. The following section will explain the proposed model and provide research to support the suggested relationships.
III. Understanding the Role of Reactions

Trainee reactions reflect an attitude toward the training developed by trainees. As such, theory on the influence of attitudes on behavior provides guidance in understanding the role that reactions play in the effectiveness of online training. The model set forth below will further explore the attitude/behavior relationship and identify important variables that are related to the effectiveness of online training courses.

Theory of Reasoned Action

This research will test a model proposed to explain the role of reactions in online training. This model is in part based upon the Theory of Reasoned Action, a theory that attempts to explain and predict behaviors. The Theory of Reasoned Action (TRA) is a social psychology model concerned with the determinants of consciously intended behaviors. Figure One presents the TRA model which suggests a person’s performance of a specified behavior is determined by his or her intention to perform a behavior, which is a product of a person’s attitude about the behavior along with a subjective norm concerning the behavior (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The TRA has been applied in many different research contexts such as consumer behavior, health, voting, recreation and organizational behavior. TRA is widely used in research because it is a theory that is intuitive, insightful in its ability to explain behavior and practical in its application to a variety of behavioral questions (Bagozzi, 1992).
An individual's attitude is an affective construct that represents the person's evaluation of the entity in question. According to the theory, attitudes are determined by the person’s beliefs about the consequences of the behavior and the evaluation of these consequences. That is, behavioral beliefs are the person's beliefs that the behavior leads to certain outcomes and the person's evaluation of those outcomes. If the benefits of the behavior outweigh the costs, the attitude regarding the behavior will be generally favorable. This positive attitude will influence behavioral intentions in favor of performing the behavior. Attitudes are considered more important to individuals if there
is a close link between the attitude object and the individual's values (Ajzen & Fishbein, 1973).

The normative component of the TRA deals with the influence of the social environment. Subjective norms are determined by beliefs about what others think the person should do about the behavior, and the person’s motivation to comply with those beliefs. If the person believes that others think that the person should perform the behavior, and if the person cares what those others think, this perceived social pressure will influence behavioral intentions in favor of performing the behavior (Ajzen & Fishbein, 1973).

TRA also suggests that the immediate antecedent of overt behavior is the person's intention to perform the behavior. The theory states that in a given situation, a person holds or forms a specific intention that influences the person's subsequent overt behavior (Ajzen & Fishbein, 1973). Although this intention may be influenced by more than one factor, attitudes are believed to be the most significant influence.

Behavior under the theory includes one or more observable actions. It is considered logical that a person will act in a manner that is consistent with their attitude toward that entity. A key assumption of the TRA is that it addresses behaviors under volitional control. A volitional behavior is an action that a person is able to perform without any obstacles. Essentially, volitional behaviors are behaviors that an individual can perform if the individual chooses to perform the behavior (Ajzen & Fishbein, 1980).

Further, attitude will only influence behavior when the attitude is specific to the behavior in question (Ajzen & Fishbein, 1977). For example, to apply this theory to
training, the attitude must be toward the specific action (learning the content as opposed to willingness to enroll), the target (a specific online training course as opposed to training in general), the context (online environment), and time (the current training course). If the attitude and the behavior entity do not correspond, there will likely not be a high correlation between the attitude and the behavior.

The model proposed in this study is a simplified version of the TRA that attempts to address some specific dimensions that are particularly relevant in an online training environment. This model differs from TRA because the relevant attitudes and behaviors in online training do not occur in the same linear sequence that the TRA suggests. Further, the normative component is not presented as part of this model. While online training does take place in an organizational setting and normative beliefs may impact some online training related behaviors, these beliefs are beyond the intent of this study. A more expansive study could examine a more direct replication of the TRA. However, this model will apply the underlying theory that attitude influences intentions and behavior to examine the utility of trainee reactions.

Proposed Model

Figure Two presents the conceptual model that suggests attitudes (reactions to the training and the trainee’s attitude toward computer technology) are related to the intention to perform the behavior (the trainee’s pre-training motivation to learn the course content) and the behavior (exerting effort to learn course materials). This model does not present the linear attitude-intention-behavior relationship suggested by the TRA.
Reaction attitudes do not exist prior to training because they develop during the training experience. As such, they do not directly influence pre-training motivation to learn. Rather, the trainee's reactions interact with pre-training motivation to affect the effort one exerts during the training course to learn the course content. The effort to learn the course content is the behavior component of the model, which is related to the learning outcome. Intention to take further online courses is also examined in this model. This intention is also related to the attitude of reactions. The following discussion further describes these variables, discusses how they relate to the TRA, and presents research to support their relationships in the model.

*Figure Two*

*The Role of Reactions in Online Training*
The Role of Computer Anxiety in Online Training

In this model, computer anxiety reflects an attitude that influences an intention, pre-training motivation to learn the course content. This model suggests that computer anxiety will correlate negatively with pre-training motivation to learn in an online training course.

Computer anxiety has become an important construct for scientists to examine as the use of computers by individuals has dramatically increased. In fact, the US Census Bureau reports that 56.3% of households in the US had a computer in 2001, compared to 51% in 2000 and 42% in 1998 (Newberger, 2001). However, not all people enjoy using computers. In fact, for some individuals, using a computer is uncomfortable and intimidating. These individuals suffer from computer anxiety.

A factor analysis by Kernan and Howard (1990) examined several computer attitude and computer anxiety scales. This analysis established that one's "general attitude" toward computers is a different construct than computer anxiety. The construct of computer anxiety is described as a fear of computers, or a need to avoid computers (Smith et al., 1999). Several factors are believed to influence feelings of anxiety towards computers. These include past experience with computers, computer literacy, self-efficacy, beliefs about the beneficial aspects of computers, and beliefs about their dehumanizing aspects (Beckers & Schmidt, 2001, Beckers & Schmidt, 2003).

The feeling of computer anxiety may have mental and physical dimensions. For example, one study revealed that individuals with a high level of computer anxiety had lower expectations of performance and reported more debilitating thoughts during an
actual computer task. These individuals also reported physical reactions such as more bodily sensations, and the need to take longer to complete a task using the computer (Glass & Knight, 1988). A self-critical internal dialogue also often accompanies computer anxiety (Hemby, 1998).

Both physical and mental reactions to the technology comprise the construct of computer anxiety, which is believed to affect one's actions while they use a computer. When an individual reacts with anxiety, the individual may not be able to participate in the training course as actively or with as much attention or effort. For this reason, the person may avoid or not want to participate in work or experiences that involve computers. Some research evidence exists to suggest that a trainee who experiences computer anxiety will have less motivation to learn the course content and will also not perform well in the training course.

Webster and Martocchio (1993) examined the effects of labeling computer software training as “work” or “play.” Computer anxiety was not the central focus of the study, however, computer anxiety and pre-training motivation were variables examined. A correlation analysis found a statistically significant negative relationship between computer anxiety and pre-training motivation ($r = -.56$, $p<.05$). This relationship indicates trainees felt less pre-training motivation when they had a higher level of computer anxiety. The study also reported a statistically significant negative relationship between computer anxiety and post-training test performance ($r = -.40$, $p<.05$). Those trainees who reported a higher level of computer anxiety did not perform as well on the post-training test.
Additional evidence exists to establish the relationship between computer anxiety and performance. Brosnan (1998) reported a significant negative relationship between computer anxiety and performance. This study examined the activities of 50 subjects in completing tasks related to navigating a database. Navigating a database was selected as a task to use in this study because it is a task that the students would most likely have to do at some point in real life. The participants were instructed in navigating the database, given tasks to complete and then asked questions to demonstrate their competency with the database. A regression analysis found computer anxiety related directly to the number of questions answered correctly ($\beta=-.23$, $p=.044$). Less anxious individuals successfully answered more questions correctly, indicating they learned more during the instruction. A possible limitation in this study, however, is that the researchers did not indicate if the subjects had previous experience using the database.

Chou (2001) also reported a negative relationship between computer anxiety and learning outcomes. While the subjects in this study were high school students, the findings do support the relationship. The course in this study provided three training sessions on using a computer to accomplish varying tasks. A learning measure was taken after the second and the third session. This learning measure consisted of both objective measures of declarative knowledge, as well as hands-on tasks to test for procedural knowledge. The author reported a significant negative correlation between computer anxiety and the first test ($r = -.24$, $p<.05$) and the second test ($r= -.19$, $p< .01$).

As these studies demonstrate, computer anxiety is related to pre-training motivation and performance outcomes in a computer-based training environment.
Essentially, it is proposed that the physical and mental response caused by computer anxiety will negatively affect a trainee's level of pre-training motivation.

**The Role of Pre-Training Motivation**

One’s effort to learn the course content is not influenced by their reaction to the course alone. One must also have an intention to learn the content (Bagozzi, 1992). Trainees who are motivated to do well in training will learn the course content by heightening their attention and increasing their receptivity to learning (Mathieu & Martineau, 1997).

Noe (1986) defined motivation to learn as the "specific desire of the trainee to learn the content of the training course (p. 743)." Noe characterizes motivation to learn as both the trainees' enthusiasm for learning and as the trainees' persistence in attempting to learn the materials when the content becomes more difficult. Noe's theory suggests that if ability levels are similar, trainees that are more motivated prior to the training are more likely to learn than those that are not motivated. Looking at a variable such as motivation takes our understanding of what influences the effectiveness of training beyond just the ability of the trainee. It seems logical that the trainee's desire to learn may influence actual learning outcomes. As explained by Tracey et al. (2001), while ability or "can do" factors are important in determining what makes training effective, we need to also pay attention to "will do" factors such as pre-training motivation.

Attributes held by a trainee may affect the trainee's pre-training motivation to learn (Noe, 1986). Pre-training motivation to learn may be influenced by a number of
factors including those related to the trainee's individual characteristics, those related to
the situation in which the training occurs and those related to the trainee's job or career
(Colquitt, LePine and Noe, 2000). In their meta-analysis, Colquitt, LePine and Noe
reported that personality factors and job related factors accounted for the most variance in
pre-training motivation.

The relationship between pre-training motivation and reactions has yet to be
thoroughly explored in research. However, it has been established that a relationship
does exist. For example, Cannon-Bowers, et al. (1995) examined several variables in a
proposed model of training effectiveness. Their study found that pre-training motivation
was strongly and positively related to both of the dimensions of trainee reactions in their
study; relevance/value ($\beta=.48 \ p<.01$) and affect/happiness ($\beta=.28, \ p<.01$). Colquitt,
LePine and Noe (2000) conducted a meta-analysis to examine training motivation, its
antecedents and its relationships with various training outcomes. Their study also found
a strong correlational relationship between motivation to learn and trainee reactions
($r_c=.45$). The study by Tracey, et al. (2001) mentioned earlier reported significant
positive correlations between both affective and utility reactions and pre-training
motivation (.46 and .44 respectively $p<.05$). Finally, a study by Klein, Noe & Wang
(2004) examined the relationship between motivation to learn and several course
outcomes in online university courses. Among other findings in this study involving 600
participants, the researchers report a significant correlation between pre-training
motivation and course satisfaction ($r = .48, \ p< .01$).
Mathieu, Tannenbaum and Salas (1992) suggested that reactions should not be linearly related to learning, but that reactions may influence the relationships between other variables that do affect learning. To test the relationships, the researchers examined 140 participants in a proofreading training course and found that reactions served a moderating role between training motivation and learning. The authors suggest their findings provide an explanation for Alliger and Janak’s (1989) failure to find a linear relationship between reactions and learning, concluding that in order for learning to occur, trainees must be motivated to learn and also have a positive reaction to the training.

As evidenced by the limited number of studies presented, the role of pre-training motivation to learn merits further exploration, particularly in the online training environment. Some evidence indicates that pre-training motivation to learn is related to the effectiveness of training. Specifically, pre-training motivation may help explain the role reactions play in the effectiveness of a training course. This model proposes that reactions serve as a moderator between pre-training motivation and effort. However, to clearly understand the role of reactions, the construct of reactions must first be defined.

**Trainee Reactions**

Reactions in this model represent an attitude that interacts with intentions (pre-training motivation) to affect the behavior of exerting effort to learn the course materials. The proposed moderating effect of reactions in this model suggests that one of four
interactions could occur to affect the amount of effort the trainee exerts to learn the course content.

First, a trainee may have a high level of pre-training motivation and then experience a positive reaction to the course. In this case, the trainee will exert a high level of effort to learn the course content. The second possibility occurs if the trainee has a high level of pre-training motivation, but then experiences a negative reaction to the course. In this case, the trainee will exert less effort to learn the course content. Finally, if the trainee starts the course with a low level of pre-training motivation, this model suggests that a positive reaction to the course will result in a higher level of effort on behalf of the trainee than if the trainee experiences a negative reaction to the course.

The Reactions Measure. As mentioned earlier, one limitation of earlier studies of trainee reactions was the uni-dimensionality of the reaction measure. Several researchers have suggested that Kirpatrick's proposed evaluation framework is limited by the uni-dimensionality of the measures. Campbell and Kuncel (2001) suggest part of the problem in looking for correlations between the levels in Kirkpatrick’s typology is the under specification of the levels. For example, the earlier discussion of the model of learning outcomes set for the by Kraiger, Ford and Salas (1993) further expanded the dimension of “learning” to provide a more complete framework of learning outcomes.

Trainee reactions are also a construct that needs clarification in measurement. Trainee reactions may range from a global judgment on how much the individual liked the course, to specific opinions on the relevance of the training content. Thus, a possible reason for the lack of consistent support for the relationship between trainee reactions and
learning is the one-dimensional approach most research has taken in examining trainee reactions. As mentioned earlier, most of the studies described earlier that examined reactions as a multi-dimensional construct found a link to learning (e.g. Alliger et al., 1997; Warr et al., 1999; Tracey et al., 2001; Tan, Hall & Boyce, 2003). Whereas, some of the studies that did not find a relationship looked at reactions as a one-dimensional construct (e.g. Noe et al., 1986; Alliger et al., 1989).

Some studies have specifically examined the factor structure of trainee reactions. Cannon-Bowers, et al. (1995) conducted a study to test key factors in building a model of training effectiveness. Their study focused on developing scales to measure key variables in the model using a military recruit training course with 1,037 trainees. A factor analysis found that reactions had two factors: 1) relevance/value and 2) affect/happiness.

A study by Morgan and Casper (2000) examined the factor structure of trainee reactions and found six factors within the construct of trainee reactions. This study examined reactions from over 9,000 trainees to several hundred training courses for a government agency over a three-year period. An exploratory factor analysis of 29 reaction items followed by a confirmatory factor analysis found that reactions are multi-dimensional. This study identified six factors that include 1) satisfaction with instructor ($\alpha=.92$), 2) overall training satisfaction ($\alpha=.87$), 3) satisfaction with testing ($\alpha=.92$), 4) utility of training ($\alpha=.91$), 5) satisfaction with materials ($\alpha=.74$) and 6) satisfaction with course structure ($\alpha=.63$).
Finally, a study by Brown (2002) that examined trainee satisfaction in an online training environment found that trainee reactions are multi-dimensional. Trainee’ reactions in this study were measured with 12 items and a confirmatory factor analysis found the presence of two distinct factors; satisfaction with content and satisfaction with technology.

It is clear that reactions need to be examined as a multi-dimensional construct; however, further research is needed to develop a universal set of reaction dimensions. These reaction dimensions may differ from traditional classroom training to online training. For example, dimensions relating to satisfaction with the delivery medium (i.e. technology) may not be appropriate for a classroom course not using technology.

The role of reactions must be further defined by examining their relationship with other variables in the model. In addition to the suggested moderating role that trainee reactions play in affecting the effort levels in the course, this model suggests that reactions are important because they affect intentions to enroll in future online training courses.

**Perceived Trainee Effort**

In this conceptual model, trainee reactions are proposed to moderate the relationship between pre-training motivation and the effort one extends to learn the training materials. In turn, increased effort will lead to better learning outcomes. Therefore, effort represents a behavior that is the result of an attitude and intention interaction.
Previous research has only focused on the direct linear relationship between trainee reactions and learning outcomes. While this approach does demonstrate some value in trainee reactions, it fails to explain why trainee reactions are important in the learning process. This model suggests that reactions are ultimately related to learning outcomes because they interact with pre-training motivation to affect the level of effort that trainees exert to learn the course content. Through exerting more effort to learn, learning outcomes should improve. Previous research has established the relationship between trainee effort and performance in training courses.

Kanfer and Ackerman suggest that attentional effort is necessary to accomplish learning tasks (1989). The theory set forth in their research explains that attentional resources provide the theoretical link between ability and performance. Effort is required to support the information processing necessary to transition from the acquisition of declarative knowledge to the point where an individual has automatized the skill and is able to perform it with little attention. Their research found that individual differences in cognitive ability clearly had an effect on performance. Because ability constrained attentional resource capacity, those with higher levels of cognitive ability had better performance. Therefore, a cognitive ability measure is important to use as a control variable when examining the relationship between effort and learning outcomes.

Fisher and Ford (1998) conceptualize effort into two categories; amount of effort and type of effort. Amount of effort includes the time spent on a training task and the mental effort or the amount of capacity allocated to the instructional demands of the training. Type of effort includes the conceptual processes involved in learning such as
encoding, organization, and retrieval. Fisher and Ford (1998) found that amount of
effort generally predicted test performance. They found time on task was a significant
predictor of performance on the knowledge outcome ($\beta=.30, p<.01$).

Another indicator of effort is how much trainees review the training material.
Sorensen, Brown and Huntley (2001) define review effort as the extent to which learners
engage in deliberate, mindful examination of materials in a training course. These
authors measured review effort by recording the time spent in review, the quantity of
material written during review periods, the quality of material written and a self-report of
review activity. After controlling for cognitive ability, the authors found self-reported
review effort influenced learning in a computer-based environment ($\beta=.22, p<.05$).

Brown (2001) examined the effect of learner choices in a computer-based training
course for a problem-solving process. The study investigated effort-related variables
such as the time spent on learning tasks and how often trainees took advantage of
optional practice opportunities. Among other findings, this study found time on task
($\beta=.18, p<.05$) and practice level ($\beta=.33, p<.01$) affected knowledge gain in this online
training environment. Similarly, Shute, Gawlick and Gluck (1998) examined the role of
learner’s control of practice opportunities in an online training course for statistics and
found learning gains increased relative to the amount of practice. However, a significant
limitation in both of these studies was the failure to control for cognitive ability.

Toney and Ford (2001) examined the relationship between learner activity and
learning in an online environment. They measured the breadth and depth of trainees’
behaviors to seek out additional information, practice and feedback during the course on
Internet web page development. The researchers found learners who engaged in a greater breadth of seeking behaviors increased their cognitive learning outcomes ($\beta=.34$, $t=4.47$, $p<.01$). They also found learners who engaged in greater depth of seeking behaviors increased their skill and affective outcomes ($\beta=.52$, $t=2.38$, $p<.01$), suggesting that learners who extended more effort in learning the course materials actually learned more.

This research suggests it is important to understand the role effort plays in learning in an online training course. An individual may be motivated to learn and have a positive reaction to the training course, but must also put forth the appropriate effort in order for learning to occur.

**Learning**

As discussed earlier, previous research suggests a relationship may exist between reactions and learning. Learning is considered an important evaluation outcome in the model of training effectiveness and therefore, to understand more clearly the role that reactions play, learning is included as an outcome in this model.

Learning is defined as "a change in human disposition or capability, which can be retained, and which is not simply ascribable to the process of growth (Gagne, 1964, p. 5).” Based on this definition, a measure of learning is a measure of change from before to after a specific learning experience. Learning experiences are either initiated internally through reflection and thinking or driven externally as a result of instruction (Cizek, 1997).
With change as the core of the definition of learning, it seems intuitive that the best measure of learning is a measure of actual change. For this reason, many believe gain scores are the best way to measure learning. Gain scores or difference scores determine differences between pretest and posttest measures that result from a period of instruction (Zimmerman & Williams, 1982).

Despite the obvious benefit of gain scores to measure learning as the amount of change that occurs, there are some concerns with the use of gain scores. For example, the difficulty of the pre-test can bias the amount of gain observed in groups that differ in initial achievement (May & Nicewander, 1998). Further, there is much debate on the reliability of gain scores. Due to frequent substantial errors in measurement in the social and behavioral sciences, caution is advised in using gain scores in these disciplines (Zimmerman & Williams, 1982). Gain scores are only reliable when individual differences in true change are appreciable (Rogosa & Willett, 1983). The challenges in establishing reliable gain score measures cause many researchers to pursue other learning measures.

Another option that some researchers pursue to measure learning is to ask trainees for their perception of their level of learning. Some argue that the trainee should be asked for their input on their learning because they are the end-customer of the training (Geertshuis, et al., 2002). However, reports of perceived learning may be a problem because they often influence students' rating of the course (Baird, 1987). If a student believes they have performed well in a course, they may report more positive reactions to the course. Because of this possible contamination of the reactions variable, perceived
learning may not be an appropriate measure for a study examining trainee reactions. Further, self-report data are often considered unreliable (Baldwin, 2000). For example, respondents may inflate the amount of learning they report in order to impress the course instructor or researcher.

Many organizations and training researchers use a post-course test to measure learning. Time and money constraints often limit the evaluation of learning to this more simple measure (Geertshuis, et al., 2002). However, a concern with using post-course test scores only to measure learning is that in the absence of pre-course knowledge data, it is difficult to determine what part of the learning, if any, is attributable to the instruction of the course (Arthur et al., 2003).

In favor of post-course test scores, Sackett and Mullen (1993) argue that a post-course assessment of level of knowledge is a sufficient learning measure when evaluating organizational training. When training is delivered, the organizational goal is a specified desired end-state. The authors suggest that while the evaluation of a training course often does seek to determine how much change has occurred, the organization may also want to determine if a specific level of performance is achieved. Even though the post-course only measure does not inform of the amount of change that has occurred, it does indicate that the organizational goal of the attainment of knowledge has occurred.

The preference for the use of post-course test scores as measures of learning is clear in training evaluation research. In the literature reviewed in this study, a majority of studies used post-course measures of learning (Brown, forthcoming; Clement, 1982; Dixon, 1990; Fisher et al., 2004; Mathieau et al., 1992; Tan et al., 2003; Tracey et al,
2001; Warr & Bunce, 1995 and Wasserman et al., 2002). Only three studies used a measure of learning gains (Ketturnak et al., 2001; Warr et al., 1999 and Noe & Schmit, 1986) and only three studies used measures of perceived learning (Arbaugh & Duray, 2001; Inman et al., 1999 and Leach & Liu, 2003).

In the present model, learning will be examined as immediate, post-course knowledge of the course content. This outcome is categorized as a cognitive learning measure in the model of learning outcomes set forth by Kraiger, Ford and Salas (1993). Immediate post-course knowledge is an appropriate measure in an online training environment because it is a measure that is easily incorporated into an online training course. The post-course test is integrated into the end of a course and the technology is often used to total the scores on such tests.

Training designers focused on maximizing the value of evaluation in a training setting will incorporate both reaction and learning measures. Further, in the online training environment, intentions to take further courses may be of particular interest to organizations and training designers.

Future Use of Online Training Courses

In addition to their relationship to learning, reactions may play an important role in predicting the future use of online training courses. Because online training creates a unique learning environment, if trainees are not satisfied with the training, they may not take future courses (Arbaugh, 2000; Brown 2002). Further, Kraiger (1995) suggests
training evaluation outcomes may be helpful to market a training course to other organizational units or future trainees.

As organizations continue to invest in the development of online training, it is important to understand factors that influence the adoption of online training by trainees. Despite extensive investments in technology and impressive advances in technological capabilities, underutilization of organizational technologies continues to exist (Venkatesh & Davis, 2000). Figure Three presents the Technology Acceptance Model (TAM), which provides a basis for understanding the role reactions play in the success of an online training initiative. TAM is an adaptation of TRA to address user acceptance of information systems with a goal of explaining the general determinants of computer acceptance (Davis et al., 1989). The technology literature discusses TAM as an explanation for the use of technology in both organizational as well as educational settings (Selim, 2003; Thong, Hong, & Tam, 2002; Martins & Kellermanns, 2004).

Similar to TRA, TAM suggests that the behavior of computer usage is determined by behavioral intentions (Davis et al., 1989). These behavioral intentions are determined by the user's attitude about the technology. This attitude is determined by the user's belief that the system is easy to use and also useful.

TAM, however, does not include a subjective norm as a determinant of behavioral intention (Selim, 2003). Davis et al.(1989), who proposed the TAM model, state that the subjective norm component is not included as a determinant of behavioral intentions because the subjective norm aspects of the TRA are the least understood. Davis suggests that subjective norms are entangled with the attitude variable because an individual's
perceptions of others' beliefs may influence the development of the individual's own attitude about the technology.

**Figure Three**

*The Technology Acceptance Model*

Several studies have supported TAM. Davis (1989) reports the results of two studies examining usage of an e-mail system and a data analysis system. This study found significant correlations between both perceived usefulness (Study 1 $r=.63$, Study 2 $r=.85$, $p<.001$) and ease of use (Study 1 $r=.45$, Study 2 $r=.59$, $p<.001$) and self-reported
indicators of system use. Thong, Hong and Tam (2002) examined TAM in the context of digital libraries. Again, perceived usefulness ($\beta=.52 \ p<.01$) and ease of use ($\beta=.11$, $p<.05$) were determinants of the user acceptance of digital libraries.

In the academic setting, Selim (2003) reported perceived usefulness was a key determinant of the acceptance and usage of a course website for several different undergraduate courses ($\beta=.84$, $t=13.14$, $p<.0001$). Another study that examined the role of perceived usefulness and ease of use on the intentions and ultimately the use of a course administrative system supported these relationships. Martins and Kellermanns (2004) report perceived usefulness and ease of use correlated with intentions to use the system ($r=.43$ and $.49$ respectively, $p < .05$). Intentions to use the system correlated with system usage ($r = .37$, $p < .05$).

TAM may also have some implications for the utility of reaction measures in helping to ensure the success of online training initiatives. If individuals have positive reactions to online training courses, then they are more likely to enroll in other online training courses. In fact, one study found support for this suggestion. Brown (forthcoming, 2005) examined the role reactions play in predicting several outcomes. Brown's study reported that overall satisfaction with training predicted intent to use the technology-delivered training again ($\beta = .65$, $p<.01$). Therefore, the model in this study suggests reactions will influence the intent to take additional online training courses.
Goal of the Present Study

The goal of this study is to test the relationships in the partial model of training course effectiveness described above. In doing so, this study will attempt to better explain the role that trainee reactions play in the effectiveness of online training courses. The model also includes other important variables that contribute to a fuller understanding of online training course effectiveness, including computer anxiety, effort and the intent to take further courses. A robust model that includes all of the variables that explain the differences in online training course effectiveness is still to be designed.

Hypotheses

To examine the model described above, this study will test the following hypotheses:

H1: Computer-anxiety will correlate with pre-training motivation.

H2: Reactions will moderate the relationship between pre-training motivation and perceived effort.

H3: Perceived effort will correlate with learning.

H4: Reactions will correlate with the intent to take future online training courses.
IV. Methodology

This study tested the model described above using the online courses available through a Midwest-based landscaping company. The online courses are available to company employees and to the public via the Internet. The participants enrolled in one of the following seven courses: 1) Introduction to Horticulture, 2) Landscaping/Grounds Maintenance, 3) Lawn Care, 4) Line Clearance, 5) Management, 6) Practical Tree Care and 7) Tree Care.

Participants

All company employees were able to enroll in the online courses. However, enrollment was not required. Further, there were no job-related incentives or rewards for completion of the courses. Employees enrolled in the courses for their own personal reasons. Company employees voluntarily enrolled in one of the online courses were invited to participate in the study. Once enrolled, the participants were entered into a drawing for a $50.00 gift certificate if they completed all parts of the study. The survey responses for the first course completed were included in the study if a trainee enrolled in more than one course. During the data collection period, 107 trainees completed a pre-course survey indicating an interest in participating in the study. However, only 26 trainees completed the training courses and the post-course survey (24%).

To expand the study sample, the company allowed a group of students enrolled in management courses at a large midwestern university to enroll in the training. These
students were offered course credit for participating in the study. A total of 77 students participated in the study.

**Measures**

The following section outlines all of the variables used in the study. All scale items are listed in Appendix B.

**Independent Variables**

**Computer Anxiety.** Computer anxiety was measured with a 5-item scale adapted from Kernan and Howard (1990) and tested in a pilot study (see Appendix A). Response options were on a 5 point Likert scale ranging from 5=*

 strongly agree* to 1=*

 strongly disagree*. A sample item is “I have avoided computers because I don’t understand them.” The reliability of the 5-item scale computed using Cronbach's alpha was .93. For each subject, the computer anxiety measure was the sum score of the 5 items.

A boxplot of the computer anxiety scores indicated two outliers. Because it was not possible to determine if these outliers were attributable to errors in data entry or if they represented legitimate extreme values, these subjects were dropped from this analysis (Howell, 2002). Further, a visual inspection of the computer anxiety scores suggested that the scores were skewed and did not meet the normality assumption that underlies correlation. A logarithmic transformation of the computer anxiety scores was conducted because of the positive skewness of the scores (Howell, 2002).
Pre-training Motivation. Pre-training motivation was measured with a 4-item scale adapted from Noe and Schmitt (1986) and tested in a pilot study (see Appendix A). Response options are on a 5 point Likert scale ranging from 5=strongly agree to 1=strongly disagree. A sample item is “I am motivated to learn the material in this course.” The reliability of the 5-item scale computed using Cronbach's alpha was .81. For each subject, the pre-training motivation measure was the sum score of the 4 items.

For the purpose of the moderator analysis in hypothesis two, each subject was categorized as "high" or "low" on the pre-training motivation variable. Total pre-training motivation scores ranged from 12 to 20. Those subjects with scores of 12 to 15 were categorized as "low" and those subjects with scores of 16-20 were categorized as "high." This cut-off was based upon a visual inspection of the distribution of scores and the mean score of 15.72. Further, the score of 15 reflects an average item score of 3.75, which is below the "agrees" designation on the pre-training motivation items. This generally reflects those who were neutral or disagreed with statements indicating they were motivated to take the training course.

Perceived Effort. The perceived effort scale is a 5-item sub-scale of the Intrinsic Motivation Inventory (Deci & Ryan, 2003). Response options are on a 5 point Likert scale ranging from 5=strongly agree to 1=strongly disagree. A sample item is “I put a lot of effort into this course.” The reliability of the 5-item scale computed using Cronbach's alpha was .77. For each subject, the perceived effort measure was the sum score of the 5 items.
Reactions. This study used several items targeted at measuring four different dimensions of reactions. The targeted dimensions include measures of satisfaction with course content, course format, perception of the ease of use of the course and the perception of course utility. Course content was selected because this dimension is commonly examined in reaction evaluations. Format is important to examine because the online delivery of the course presents a unique delivery format. Perceptions of ease of use and utility were selected because of their connection with the Technology Acceptance Model (TAM) discussed above.

Three of the targeted dimensions of reactions were measured with sub-scales adapted from Kettanurak et.al (2001). These dimensions included a 4-item scale measuring satisfaction with course content ($\alpha = .87$), a 5-item scale measuring satisfaction with course format ($\alpha = .81$) and a 3-item scale measuring perception of the ease of use of the course ($\alpha = .82$). A scale of 3 items adapted from Morgan and Casper (2000) measured a fourth dimension of reactions, the perception of utility of the training. Morgan and Casper did not report the coefficient alpha for this scale, however, they report that the alphas for all of the scales identified in their study fell between .74 and .92. Finally, overall satisfaction was measured with 3 items adapted from a scale developed by Kettanurak et.al (2001). Response options for each sub-scale fall along a 5-point Likert scale ranging from 5=strongly agree to 1=strongly disagree.

A factor analysis was conducted to explore the proposed multi-dimensional structure of the reaction variable. The factor analysis of the eighteen items was conducted using Principal Components Analysis (PCA) with Varimax rotation. PCA was
the selected extraction technique in this study because of the exploratory nature of the analysis and also the intention to account for the most variance possible (Pett, et al., 2003). Varimax rotation is the recommended method to make factor loadings large or small enough to facilitate interpretation (Rencher, 2002). Factors with eigenvalues greater than one were retained. The rotated solution, as shown in Table One, yielded four interpretable factors: perceived utility, perceived ease of use, satisfaction with course format and satisfaction with content. The four factors cumulatively accounted for 60.71% of the variance.

For the purpose of data analysis, the reaction measure was computed by first calculating the factor scores for each of the reaction dimensions using the regression method. Factor scores were used because they provide a standardized linear composite that reflects the actual contribution of each item to each factor. Each factor is weighted relative to the other factors based on the contribution each factor makes to the amount of variance explained by the factor solution (Pett, et al., 2003). This calculation resulted in four factors that were then summed to create the reaction measure.

For the moderator analysis in hypothesis two, each subject was categorized as having "positive" or "negative" reactions to the training. The reactions variable was dichotomized at the standardized mean, zero. Those with total factor scores below zero were classified as having negative reactions. Those with total factor scores above zero were classified as having positive reactions.
### Table One Factor Analysis of Trainee Reactions

<table>
<thead>
<tr>
<th>Items</th>
<th>Utility</th>
<th>Ease of Use</th>
<th>Format</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor One: &quot;Perceived Utility&quot; α = .84</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue = 4.47, % variance explained = 24.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The instructional material was comprehensive.</td>
<td>.509</td>
<td>.117</td>
<td>.369</td>
<td>-.078</td>
</tr>
<tr>
<td>The content of the course helped me learn important concepts.</td>
<td>.724</td>
<td>-.024</td>
<td>-.073</td>
<td>.167</td>
</tr>
<tr>
<td>I believe the course objectives closely matched my idea of what I expected would be taught.</td>
<td>.533</td>
<td>-.011</td>
<td>.123</td>
<td>.335</td>
</tr>
<tr>
<td>This course will help me improve my performance on my job.</td>
<td>.674</td>
<td>-.021</td>
<td>.144</td>
<td>.167</td>
</tr>
<tr>
<td>I believe that the course content is relevant to my job.</td>
<td>.603</td>
<td>-.013</td>
<td>.132</td>
<td>.255</td>
</tr>
<tr>
<td>Overall, I found the content of the course valuable.</td>
<td>.767</td>
<td>.089</td>
<td>.052</td>
<td>.241</td>
</tr>
<tr>
<td>I was able to complete the course without additional help.</td>
<td>.591</td>
<td>.280</td>
<td>-.357</td>
<td>-.215</td>
</tr>
<tr>
<td>Overall, I was very satisfied with the presentation of the content of the course.</td>
<td>.636</td>
<td>.403</td>
<td>.252</td>
<td>-.011</td>
</tr>
<tr>
<td>Overall, I had a very positive learning experience</td>
<td>.742</td>
<td>.206</td>
<td>.085</td>
<td>.144</td>
</tr>
<tr>
<td><strong>Factor Two: &quot;Perceived Ease of Use&quot; α = .82</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue = 2.99, % variance explained = 16.58</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I was able to navigate through the course content in the order I desired.</td>
<td>-.054</td>
<td>.763</td>
<td>.098</td>
<td>.278</td>
</tr>
<tr>
<td>The text on the computer screen was easy to read.</td>
<td>.301</td>
<td>.620</td>
<td>.151</td>
<td>.030</td>
</tr>
<tr>
<td>Overall, the training course was user-friendly.</td>
<td>.017</td>
<td>.849</td>
<td>.135</td>
<td>.043</td>
</tr>
<tr>
<td>Overall, I found the course easy to use.</td>
<td>.052</td>
<td>.885</td>
<td>-.118</td>
<td>.081</td>
</tr>
<tr>
<td><strong>Factor Three: &quot;Satisfaction with Course Format&quot; α = .64</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue = 1.93, % variance explained = 10.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I believe that a good variety of displays (text, graphs, etc.) were used.</td>
<td>.375</td>
<td>.283</td>
<td>.531</td>
<td>.267</td>
</tr>
<tr>
<td>The learning was enhanced by the graphics (pictures, graphs etc.).</td>
<td>.401</td>
<td>.100</td>
<td>.674</td>
<td>-.261</td>
</tr>
<tr>
<td>The course was enhanced by the use of sound and voice.</td>
<td>-.095</td>
<td>.032</td>
<td>.832</td>
<td>.106</td>
</tr>
<tr>
<td><strong>Factor Four: &quot; Satisfaction with Course Content&quot; α = .72</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eigenvalue = 1.54, % variance explained = 8.56</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The course content was clear.</td>
<td>.437</td>
<td>.183</td>
<td>.085</td>
<td>.656</td>
</tr>
<tr>
<td>I could easily understand the course content.</td>
<td>.304</td>
<td>.289</td>
<td>-.046</td>
<td>.714</td>
</tr>
</tbody>
</table>
Control Variables

Demographic Variables. The pre-course survey asked respondents for information about their age, gender, race and education level attained.

Cognitive Ability. Research has shown that a significant predictor of learning is the cognitive ability of the trainee (Ree & Earles, 1991). As a measure of cognitive ability, participants were asked to complete the Llobet Reasoning Test, developed by PsyMetrics. The Llobet Reasoning Test was administered online and includes 20 test items with a time limit of 8 minutes. Criterion-related validity studies by PsyMetrics report the test correlates significantly with learning ability (r=.41, p<.001), problem-solving ability (r=.44, p<.001) and the ability to understand instructions (r=.24, p<.003). PsyMetrics also reports a split-half reliability coefficient of .79, (2003). In addition to this cognitive ability measure, participants were also asked to report the highest level of education they completed and their high school grade point average.

Dependent Variables

Learning. Learning was measured using multiple-choice job knowledge tests written by the company's subject matter experts who contributed the content for the development of the courses. These tests comprise a measure of cognitive learning as defined by Kraiger, Ford and Salas (1993). As discussed earlier, this measure is the easiest to obtain in the online training environment because the test is added at the end of each section of the training and the technology is used to automatically total the scores.
Further, because most of the training content of these training courses is declarative knowledge, a multiple-choice test is an appropriate assessment.

The test items were written over five years ago when the online training courses were developed. Each course includes between 9 and 14 chapter sub-tests and each sub-test has 25 items. The chapter sub-test scores for each subject were totaled and averaged to create a learning measure for each subject. Table Two lists each course, the number of sub-tests, the number of study participants that completed the course, the mean score and the standard deviation for each course.

Table Two

<table>
<thead>
<tr>
<th>Course</th>
<th>Sub-tests</th>
<th>Total Subjects</th>
<th>Mean Score</th>
<th>S.D.</th>
<th>Min. Score</th>
<th>Max Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Horticulture</td>
<td>14</td>
<td>2</td>
<td>61.00</td>
<td>12.73</td>
<td>52</td>
<td>70</td>
</tr>
<tr>
<td>Grounds Maintenance</td>
<td>13</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Lawn Care</td>
<td>9</td>
<td>1</td>
<td>86.00</td>
<td>n/a</td>
<td>86</td>
<td>86</td>
</tr>
<tr>
<td>Line Clearance</td>
<td>13</td>
<td>7</td>
<td>73.14</td>
<td>9.30</td>
<td>56</td>
<td>83</td>
</tr>
<tr>
<td>Management</td>
<td>11</td>
<td>85</td>
<td>88.21</td>
<td>6.51</td>
<td>60</td>
<td>98</td>
</tr>
<tr>
<td>Practical Tree Care</td>
<td>9</td>
<td>2</td>
<td>90.50</td>
<td>.71</td>
<td>90</td>
<td>91</td>
</tr>
<tr>
<td>Tree Care</td>
<td>12</td>
<td>6</td>
<td>84.83</td>
<td>4.62</td>
<td>76</td>
<td>89</td>
</tr>
</tbody>
</table>
Intent to Take Further Courses. Three items were used to measure the employee participant’s intent to take further courses. The trainees were asked if they intended to take further online courses with the company, if they intended to take further online training courses beyond those offered by the company and also if they would recommend this course to others. Response options for these questions were on a 5 point Likert scale ranging from 5=strongly agree to 1=strongly disagree. The reliability of the 3-item scale computed using Cronbach's alpha was .80. For each subject, the intent score was the sum of the three items. A visual inspection of the intent scores suggested that the employee intent scores were skewed and did not meet the normality assumption that underlies correlation. A logarithmic transformation of the employee intent scores was conducted because of the positive skewness of the scores (Howell, 2002).

Because the student group did not have the opportunity to take further courses through the company, a second intent scale was developed. The students were asked if they intended to take further online courses and if they would recommend this course to others. Response options for these questions were on a 5 point Likert scale ranging from 5=strongly agree to 1=strongly disagree. The reliability of the 3-item scale computed using Cronbach's alpha was .92. For each subject, the intent score was the sum of the three items.

Procedure

Company employees enrolled in a training course were contacted via e-mail and invited to participate in the study. Students were invited to participate in the study by the
course instructor during class. Those students who expressed interest in the study were sent instructions via e-mail.

The participants agreed to participate by completing a pre-course survey that included demographic information and measures of computer anxiety and pre-training motivation. Participants then completed all segments of the online training course and the knowledge post-tests at the end of each segment. After finishing the course, participants completed the online cognitive ability test and a post-course survey measuring perceived effort and trainee reactions. Appendix C contains all participant correspondence and Appendix D contains a copy of the pre and post-course surveys.

Data Analysis

The sample in this study was comprised of two groups (employees and University students). Because these two groups potentially differed on study variables, they were compared so that the data analysis could control for any differences between the groups. A Hotelling's T test was used for the comparison because the study had more than one outcome variable (Harris, 2001).

Hypothesis Testing

The following analyses were used to test the hypotheses:

\textit{H1: Computer-anxiety will correlate with pre-training motivation.}

H1 was tested by examining the bi-variate correlation between computer-anxiety and pre-training motivation. H1 was accepted if a statistically significant negative correlation was found between the two variables.
**H2:** *Reactions will moderate the relationship between pre-training motivation and perceived effort.*

H2 was tested by examining the moderating effect of reactions on the relationship between pre-training motivation and effort using the procedure recommended by Baron and Kenny (1986). The reactions and pre-training motivation variables were dichotomized and a 2 x 2 ANOVA was computed. H2 was accepted if there was a significant interaction effect between the reactions and pre-training motivation variables.

**H3:** *Perceived effort will correlate with learning.*

H3 was tested by examining the bi-variate correlation between perceived effort and learning. H3 was accepted if a statistically significant positive correlation was found between the two variables.

**H4:** *Reactions will correlate with the intent to take future online training courses.*

H4 was tested by examining the bi-variate correlation between reactions and intent to take further courses. H4 was accepted if a statistically significant positive correlation was found between the two variables.

**Significance Testing**

A less conservative alpha level of \( p < .10 \) was used in this study to test the significance of the hypotheses noted above. Sauley and Bedian (1989) argue that when sample size and/or anticipated effect size is small, a less conservative significance level for testing is appropriate. This study had less than 100 subjects. There is also good reason expect a smaller effect size for the hypothesized relationships.
The effect sizes will likely be small because the model explains the utility of only trainee reactions in online training, while research has identified other factors that also explain differences in the dependent variables. For example, prior research has identified several antecedents to the pre-training motivation levels of trainees (Noe, 1986; Colquitt, LePine and Noe, 2000). As such, computer anxiety is but one of several variables that may affect a trainee’s level of pre-training motivation.

Sauley and Bedian (1989) also suggest a less conservative cut-off is acceptable when a hypothesis is consistent with previous research. As the literature review above details, all of the hypothesized relationships in this study have been supported by previous research. Finally, other authors have supported using a less conservative alpha level for significance testing as a technique to increase statistical power to detect a true relationship (Cascio & Zedeck, 1983; Mone, Mueller & Mauland, 1996).

Hypotheses one, three and four were examined using one-tailed significance tests. A one-tailed test is appropriate for these analyses because the directions of the relationships are hypothesized a priori (Howell, 2002) and the directional nature of the relationships are well supported based on both theory and previous research.
V. Results

The following section presents the results of the data analysis. First, the employee and student groups are compared on the study variables. This is followed by the results of the hypotheses tests.

Subject Group Comparison

Because the study sample was comprised of two potentially different smaller samples, the employee group and the student group were compared to determine if they differed significantly on any of the variables in the study. A Hotelling's $T^2$ test was computed between the mean vectors across all applicable variables for those subjects who were company employees and for those subjects who were students. Table Three reports the means and standard deviations for each group. There was a statistically significance difference between the two groups ($F_{(11,75)} = 5.08, p = .000$). Tests of between-subjects effects showed significant differences on the variables of age ($F = 18.19, p = .000$), high school grade point average ($F = 10.42, p = .002$), and pre-training motivation ($F = 12.09, p = .001$).

The analysis indicated that overall, the student group was younger, had a higher high school grade point average, and had lower levels of pre-training motivation to learn. How these group differences in age, high school grade point average and pre-training motivation were dealt with in the analysis is addressed in the sections that follow. Table Four reports means, standard deviations and correlations for all study variables.
Table Three

Means and Standard Deviations of Groups for Comparison

<table>
<thead>
<tr>
<th>Variable</th>
<th>Student Group</th>
<th>Employee Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Age*</td>
<td>26.99</td>
<td>8.33</td>
</tr>
<tr>
<td>Gender</td>
<td>1.49</td>
<td>.50</td>
</tr>
<tr>
<td>Race</td>
<td>2.16</td>
<td>.93</td>
</tr>
<tr>
<td>Education</td>
<td>4.25</td>
<td>1.07</td>
</tr>
<tr>
<td>Llobet test</td>
<td>12.94</td>
<td>3.17</td>
</tr>
<tr>
<td>Grade point average*</td>
<td>10.17</td>
<td>1.76</td>
</tr>
<tr>
<td>Pre-training motivation*</td>
<td>15.25</td>
<td>2.17</td>
</tr>
<tr>
<td>Computer anxiety</td>
<td>7.70</td>
<td>3.81</td>
</tr>
<tr>
<td>Reactions</td>
<td>-.215</td>
<td>2.07</td>
</tr>
<tr>
<td>Perceived effort</td>
<td>19.25</td>
<td>2.87</td>
</tr>
<tr>
<td>Learning</td>
<td>87.10</td>
<td>7.73</td>
</tr>
</tbody>
</table>

* Groups differed significantly on these variables.
Table Four

Descriptive Statistics and Correlations for all Study Variables

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age</td>
<td>29.19</td>
<td>9.70</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Gender</td>
<td>1.55</td>
<td>.50</td>
<td>.02</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Race</td>
<td>2.19</td>
<td>.89</td>
<td>.20*</td>
<td>.15</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Education</td>
<td>4.15</td>
<td>1.11</td>
<td>.21**</td>
<td>-.13</td>
<td>.10</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Llobet Test</td>
<td>12.75</td>
<td>3.06</td>
<td>.08</td>
<td>.02</td>
<td>-.16</td>
<td>.04</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Grade point average</td>
<td>9.87</td>
<td>1.87</td>
<td>-.12</td>
<td>-.32***</td>
<td>-.03</td>
<td>.27***</td>
<td>.19*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Pre-train Motivation</td>
<td>15.72</td>
<td>2.26</td>
<td>.14</td>
<td>-.03</td>
<td>.04</td>
<td>.11</td>
<td>-.06</td>
<td>.05</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Computer anxiety</td>
<td>7.68</td>
<td>3.61</td>
<td>.06</td>
<td>-.02</td>
<td>.07</td>
<td>-.17*</td>
<td>.12</td>
<td>-.15</td>
<td>-.16*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Reactions</td>
<td>0</td>
<td>2.00</td>
<td>.01</td>
<td>-.19*</td>
<td>-.13</td>
<td>-.05</td>
<td>.06</td>
<td>.11</td>
<td>.33***</td>
<td>-.16*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Perceived effort</td>
<td>19.55</td>
<td>2.94</td>
<td>.26***</td>
<td>-.28***</td>
<td>.07</td>
<td>.09</td>
<td>-.06</td>
<td>.02</td>
<td>.38***</td>
<td>.04</td>
<td>.26***</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Learning</td>
<td>86.49</td>
<td>8.4</td>
<td>.14</td>
<td>-.16</td>
<td>.13</td>
<td>.30***</td>
<td>.17</td>
<td>.28***</td>
<td>-.10</td>
<td>-.22**</td>
<td>.04</td>
<td>.07</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Intent (employee)</td>
<td>13.73</td>
<td>1.61</td>
<td>.07</td>
<td>-.04</td>
<td>-.07</td>
<td>.11</td>
<td>.17</td>
<td>-.10</td>
<td>.16</td>
<td>.36*</td>
<td>.45**</td>
<td>.60***</td>
<td>-.27</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>13. Intent (student)</td>
<td>11.41</td>
<td>2.50</td>
<td>-.11</td>
<td>-.19</td>
<td>-.15</td>
<td>.06</td>
<td>-.13</td>
<td>.10</td>
<td>.46***</td>
<td>-.15</td>
<td>.36***</td>
<td>.27</td>
<td>-.25*</td>
<td>----</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* p < .10
** p < .05
*** p < .01

Note: All critical values are based on two-tailed tests except those in **bold**, which are one-tailed.
Hypothesis One: Computer Anxiety and Pre-training Motivation

Hypothesis one stated that computer anxiety would correlate negatively with pre-training motivation. The analysis resulted in a correlation of -.16 between computer anxiety and pre-training motivation (n = 99, p = .059). Because the employee and the student subject groups differed significantly on the variables of age and grade point average, a partial correlation coefficient was calculated controlling for these variables (r=-.15, n = 94, p = .079). These results are significant at the p < .10 level.

The employee and student subject groups also differed significantly on the pre-training motivation variable. Therefore, a separate correlation coefficient was computed for each group. The computation resulted in a significant negative correlation between computer anxiety and pre-training motivation for the student group (r = -.28, n=75, p=.008). The partial correlation for the student group controlling for age and grade point average was also significant (r = -.27, n=70, p=.012).

However, the correlation between computer anxiety and pre-training motivation for the employee group was .098, which was not significant (n = 24, p = .33). The partial correlation controlling for age and grade point average was .17, which was also not significant (n = 20, p = .23). Because the analysis for the employee group did not result in a significant correlation, this study found moderate support for hypothesis one.

Hypothesis Two: Reactions as a Moderator

Hypothesis two stated that reactions would moderate the relationship between pre-training motivation and effort. A 2 x 2 ANCOVA was conducted to test the
hypothesis that reactions moderate the relationship between pre-training motivation and effort. Instead of the planned ANOVA, the ANCOVA was conducted in order to control for the relevant differences between the student and employee groups on the study variables. Because the student and the employee groups differed significantly on age and grade point average, these variables were entered as covariates. The means and standard deviations for effort as a function of the two factors are presented in Table Five.

The ANCOVA indicated no significant interaction between pre-training motivation and reactions ($F_{(1,94)} = .796, p = .375$). There was a significant effect for age ($F_{(1,94)} = 4.58, p = .035$), but not for grade point average ($F_{(1,94)} = .019, p = .890$). Table Six presents the results of the analysis.

**Table Five**

*Means and Standard Deviations for Effort*

<table>
<thead>
<tr>
<th>Pre-training motivation (PTM)</th>
<th>Reactions</th>
<th>Effort Mean</th>
<th>Effort Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low PTM</td>
<td>Negative Reactions</td>
<td>17.59</td>
<td>2.88</td>
</tr>
<tr>
<td></td>
<td>Positive Reactions</td>
<td>19.95</td>
<td>2.27</td>
</tr>
<tr>
<td>High PTM</td>
<td>Negative Reactions</td>
<td>19.64</td>
<td>2.94</td>
</tr>
<tr>
<td></td>
<td>Positive Reactions</td>
<td>21.14</td>
<td>2.53</td>
</tr>
</tbody>
</table>
**Table Six**

*Analysis of Covariance for Effort, Full Sample*

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>32.05</td>
<td>1</td>
<td>32.05</td>
<td>4.579</td>
<td>.035</td>
</tr>
<tr>
<td>GPA</td>
<td>.131</td>
<td>1</td>
<td>.131</td>
<td>.019</td>
<td>.891</td>
</tr>
<tr>
<td>Pre-training motivation</td>
<td>50.65</td>
<td>1</td>
<td>50.655</td>
<td>7.23</td>
<td>.008</td>
</tr>
<tr>
<td>Reactions</td>
<td>79.96</td>
<td>1</td>
<td>79.96</td>
<td>11.42</td>
<td>.001</td>
</tr>
<tr>
<td>Pre-training motivation*Reactions</td>
<td>5.57</td>
<td>1</td>
<td>5.57</td>
<td>.796</td>
<td>.375</td>
</tr>
<tr>
<td>Error</td>
<td>658.331</td>
<td>94</td>
<td>7.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>876.91</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Because the employee and student groups differed significantly on the pre-training motivation variable, a separate analysis should be completed for each group. However, the analysis could not be completed for the employee group due its small sample size (n=26). A 2 x 2 ANCOVA was conducted for the student group and the findings were consistent with the findings for the combined group. The means and standard deviations for effort as a function of the two factors for the student group only are presented in Table Seven. The ANCOVA indicated no significant interaction between pre-training motivation and reactions ($F_{(1,70)} = .003, p = .608$). The results of the analysis are reported in Table Eight.
Table Seven

Means and Standard Deviations for Effort, Student Group Only

<table>
<thead>
<tr>
<th>Pre-training motivation (PTM)</th>
<th>Reactions</th>
<th>Effort Mean</th>
<th>Effort Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low PTM</td>
<td>Negative Reactions</td>
<td>17.74</td>
<td>2.93</td>
</tr>
<tr>
<td></td>
<td>Positive Reactions</td>
<td>19.85</td>
<td>2.28</td>
</tr>
<tr>
<td>High PTM</td>
<td>Negative Reactions</td>
<td>19.07</td>
<td>2.73</td>
</tr>
<tr>
<td></td>
<td>Positive Reactions</td>
<td>21.27</td>
<td>2.34</td>
</tr>
</tbody>
</table>

Table Eight

Analysis of Covariance for Effort, Student Group Only

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>11.29</td>
<td>1</td>
<td>11.29</td>
<td>1.66</td>
<td>.202</td>
</tr>
<tr>
<td>GPA</td>
<td>5.74</td>
<td>1</td>
<td>5.74</td>
<td>.84</td>
<td>.362</td>
</tr>
<tr>
<td>Pre-training motivation</td>
<td>29.28</td>
<td>1</td>
<td>29.28</td>
<td>4.29</td>
<td>.042</td>
</tr>
<tr>
<td>Reactions</td>
<td>69.79</td>
<td>1</td>
<td>69.79</td>
<td>10.23</td>
<td>.002</td>
</tr>
<tr>
<td>Pre-training motivation*Reactions</td>
<td>.02</td>
<td>1</td>
<td>.02</td>
<td>.003</td>
<td>.957</td>
</tr>
<tr>
<td>Error</td>
<td>477.42</td>
<td>70</td>
<td>6.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>625.737</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To further explore the possible moderating effect of trainee reactions, ANCOVA's were conducted to examine the four dimensions of the reactions variable that were confirmed through the factor analysis. Previous research has established that often one dimension of trainee reactions is more strongly related to outcomes than another.
dimension (Alliger et al., 1997; Tracey et al., 2001 and Kettanurak et al., 2001). A separate ANCOVA was conducted for each of the four reaction dimensions of perceived utility, perceived ease of use, satisfaction with course format and satisfaction with course content. The ANCOVA analyses resulted in a significant interaction effect for the dimension of satisfaction with course format \((F_{(1,94)} = 3.25, p = .075)\). There was not an interaction effect for the perceived utility dimension, the perceived ease of use dimension or the satisfaction with course content dimension. Tables Nine through Twelve present the results of the analysis.

---

**Table Nine**

*Analysis of Covariance for Effort, (Perceived Utility)*

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>32.74</td>
<td>1</td>
<td>32.74</td>
<td>4.57</td>
<td>.035</td>
</tr>
<tr>
<td>GPA</td>
<td>.13</td>
<td>1</td>
<td>.13</td>
<td>.02</td>
<td>.893</td>
</tr>
<tr>
<td>Pre-training motivation</td>
<td>48.15</td>
<td>1</td>
<td>48.15</td>
<td>6.72</td>
<td>.011</td>
</tr>
<tr>
<td>Utility</td>
<td>69.46</td>
<td>1</td>
<td>69.46</td>
<td>9.68</td>
<td>.002</td>
</tr>
<tr>
<td>Pre-training motivation*Utility</td>
<td>.234</td>
<td>1</td>
<td>.234</td>
<td>.03</td>
<td>.857</td>
</tr>
<tr>
<td>Error</td>
<td>673.96</td>
<td>94</td>
<td>7.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>876.91</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table Ten

Analysis of Covariance for Effort, (Perceived Ease of Use)

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>45.52</td>
<td>1</td>
<td>45.52</td>
<td>5.83</td>
<td>.018</td>
</tr>
<tr>
<td>GPA</td>
<td>1.41</td>
<td>1</td>
<td>1.41</td>
<td>.181</td>
<td>.672</td>
</tr>
<tr>
<td>Pre-training motivation</td>
<td>64.87</td>
<td>1</td>
<td>64.87</td>
<td>8.32</td>
<td>.005</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>10.60</td>
<td>1</td>
<td>10.60</td>
<td>1.36</td>
<td>.247</td>
</tr>
<tr>
<td>Pre-training motivation*Ease of Use</td>
<td>.074</td>
<td>1</td>
<td>.074</td>
<td>.009</td>
<td>.923</td>
</tr>
<tr>
<td>Error</td>
<td>733.41</td>
<td>94</td>
<td>7.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>876.91</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table Eleven

Analysis of Covariance for Effort, (Satisfaction with Format)

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>43.65</td>
<td>1</td>
<td>43.65</td>
<td>5.71</td>
<td>.019</td>
</tr>
<tr>
<td>GPA</td>
<td>2.06</td>
<td>1</td>
<td>2.06</td>
<td>.27</td>
<td>.605</td>
</tr>
<tr>
<td>Pre-training motivation</td>
<td>77.77</td>
<td>1</td>
<td>77.77</td>
<td>10.18</td>
<td>.002</td>
</tr>
<tr>
<td>Format</td>
<td>.844</td>
<td>1</td>
<td>.844</td>
<td>.11</td>
<td>.740</td>
</tr>
<tr>
<td>Pre-training motivation*Format</td>
<td>24.85</td>
<td>1</td>
<td>24.85</td>
<td>3.25</td>
<td>.075</td>
</tr>
<tr>
<td>Error</td>
<td>718.46</td>
<td>94</td>
<td>7.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>876.91</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table Twelve

Analysis of Covariance for Effort, (Satisfaction with Content)

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>37.30</td>
<td>1</td>
<td>37.30</td>
<td>4.79</td>
<td>.031</td>
</tr>
<tr>
<td>GPA</td>
<td>1.74</td>
<td>1</td>
<td>1.74</td>
<td>.22</td>
<td>.637</td>
</tr>
<tr>
<td>Pre-training motivation</td>
<td>63.06</td>
<td>1</td>
<td>63.06</td>
<td>8.10</td>
<td>.005</td>
</tr>
<tr>
<td>Content</td>
<td>7.22</td>
<td>1</td>
<td>7.22</td>
<td>.93</td>
<td>.338</td>
</tr>
<tr>
<td>Pre-training motivation*Content</td>
<td>4.28</td>
<td>1</td>
<td>4.28</td>
<td>.55</td>
<td>.460</td>
</tr>
<tr>
<td>Error</td>
<td>731.74</td>
<td>94</td>
<td>7.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>876.91</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
This analysis did not result in a significant interaction effect for the overall reactions variable. However, the interaction term was significant for the satisfaction with course format dimension of reactions. This indicates that satisfaction with course format does serve as a moderator for the relationship between pre-training motivation and effort. Therefore, hypothesis two is partially supported.

Hypothesis Three: Effort and Learning

Hypothesis three stated that perceived effort would correlate significantly with learning. A correlation coefficient was computed to examine the relationship between perceived effort and the learning outcome. The correlation between these variables was .07, which was not significant (n = 103, p = .254). Because the employee and the student subject groups differed significantly on the variables of age, grade point average, and pre-training motivation, a partial correlation coefficient was calculated holding these variables constant. With these variables held constant, the effort and learning correlation was .09, which is not significant (n = 95, p = .189). Therefore, it is concluded that perceived effort and learning are not related and hypothesis three is not supported.

Hypothesis Four: Reactions and Intent to Take Further Courses

Hypothesis four suggested that reactions would correlate significantly with the intent to take further courses. As mentioned earlier, a different intent scale was used for the employee group and the student group. The intent scale for the employees asked if the participant intended to take further online courses through the company. This question was not applicable for the student group, and therefore, the students were asked
if they intended to take any further online courses. Therefore, the employee and student
groups were analyzed separately.

Correlation coefficients were computed to examine the relationship between
reactions and the intent to take further courses. Reactions correlated positively and
significantly for both the employee ($r = .45, p = .011, n = 26$) and the student ($r = .36, p =
.005, n = 51$) groups. Therefore, hypothesis four is supported.
VI. Discussion

Although the results of this study failed to fully support the proposed model, there are some interesting findings. While the overall utility of a trainee reaction measure in online training is not fully clear, the results of this study provide some insight and direction for future research. Also, some of the limitations identified in this study provide guidance in designing future research that explores the role of trainee reactions in online training courses.

Computer Anxiety and Pre-training Motivation

The intuitive assumption that computer anxiety is negatively related to pre-training motivation in an online training course was supported by this study. Although the support was moderate, this is an important finding. It suggests that organizational training designers need to better understand the influence of computer anxiety on the ultimate effectiveness of online training courses. Because computer anxiety influences a trainee's motivation, it would be prudent to design appropriate interventions to reduce anxiety and as a result, increase pre-training motivation. By doing so, training designers may be able to improve the overall effectiveness of online training courses.

Future research will likely provide more support for the relationship between computer anxiety and pre-training motivation. For example, this study only examined the computer anxiety and pre-training motivation levels of those trainees who voluntarily enrolled in the training course. As such, those with very high levels of computer anxiety may have had such low levels of pre-training motivation that they did not enroll in the
training. A study examining computer anxiety and pre-training motivation in a mandatory training program would likely find a stronger relationship. This is discussed further in the Future Research section that follows.

Interestingly, there was also a significant negative correlation between computer anxiety and learning ($r = -0.22$, $p < .05$). This finding is consistent with previous research (see Webster & Martocchio, 1993; Brosnan, 1998; and Chou, 2001), and suggests that training designers should consider ways to make online training programs more user-friendly for those with a fear of computers. For example, designers could integrate into the course an optional, introductory tutorial to help an apprehensive trainee feel more comfortable with the course. It is possible that such an intervention could help improve learning outcomes.

**Reactions as a Moderator**

The results partially supported the hypothesis that trainee reactions moderate the relationship between pre-training motivation and effort. Although the overall reaction measure was not a significant moderator, previous research suggested that an analysis of each of the four reaction dimensions was warranted. An analysis of the four dimensions separately indicated that satisfaction with course format did moderate the relationship between pre-training motivation and effort.

This finding suggests that trainee reactions may be of particular importance in the online training environment. The course format dimension reflected a trainee's reaction to the features of the course such as graphics and sound. As such, this is an important
finding for online training designers because it suggests that online training courses should be designed to include features that cause trainees to react positively.

While the overall reaction measure was not a significant moderator, this may have been due to the nature of moderator research and/or the complexity of the pre-training motivation, reaction and effort variables. For example, because field research lacks the control of an experimental study, field researchers have consistently found it difficult to detect proposed moderated relationships (McClelland & Judd, 1993). Concerns such as small sample size and uncontrolled noise are believed to make the detection of moderated relationships challenging. A study in a more controlled environment may yield different findings. This is discussed further below in the Future Research section.

As noted above, the complexity of the motivation, reaction and effort variables also likely make it more difficult to assess the true nature of the moderated relationship. For example, motivation and trainee reactions are constructs that represent the trainee's current state, which could change during the training course. States are often difficult to measure because they are not stable; states can easily change over time and in different situations (Chaplin, et al., 1988). Moreover, trainee effort levels likely vary throughout the progression of the course.

In order to fully detect the proposed interaction, the motivation, reaction and effort variables may need to be examined throughout the training course. For example, a trainee may begin the course with a high level of motivation. As the trainee proceeds through the training course, the trainee's motivation level could vary as a function of his/her reaction to the training course. The trainee might, for example, feel more motivated to learn during more interesting components of the course. Finally, as trainee
motivation levels vary as a function of their reactions to the course, there are likely corresponding increases or decreases in their level of effort. Therefore, the timing of the measurements as well as the mode of measurement may establish a moderated effect. Suggestions about changes in the measurement of these variables are discussed in the Future Research section below.

**Additional Pre-training Motivation, Reaction and Effort Relationships**

While there was only partial support for reactions as a moderator of the pre-training motivation and effort relationship, the results do provide some insight regarding the relationships among the pre-training motivation, reactions and effort variables. Although there were no hypotheses offered for these relationships, it is useful to look at both those that are consistent with prior research as well as those which prior research has not examined.

Consistent with prior research, correlation analyses in this study confirmed the significant relationship between pre-training motivation and reactions ($r = .33, p < .01$). Several studies have reached similar conclusions regarding the relationship between pre-training motivation and trainee reactions (see Cannon-Bowers et al., 1995; LePine & Noe, 2000, Tracey et al., 2001 and Klein, Noe & Wang, 2004).

The correlation analysis and the ANCOVA's conducted both provide insight on the relationship between pre-training motivation and effort and the relationship between reactions and effort. It is important to examine the ANCOVA results in addition to the correlations because the ANCOVA analysis controlled for the effects of age and GPA,
which were variables on which the employee and the student groups differed significantly.

The correlation analysis indicated that pre-training motivation and trainee reactions are both related to effort. The analysis resulted in a significant correlation between pre-training motivation and effort and also between reactions and effort ($r = .38$ and $r = .26$ respectively, $p < .01$). This is an interesting observation because research has not yet explored antecedents to effort in training courses.

Further, the ANCOVA resulted in a significant main effect for pre-training motivation ($F_{(1,94)} = 7.23$, $p = .008$). This main effect indicated that those with high pre-training motivation reported exerting more effort on the course. Similarly, the ANCOVA analysis for the student group resulted in a significant main effect for pre-training motivation ($F_{(1,70)} = 4.29$, $p = .042$). Again, the pre-training motivation main effect indicated that those students with high pre-training motivation reported exerting more effort on the course.

More importantly, the ANCOVA analysis also resulted in a significant main effect for the reactions variable ($F_{(1,94)} = 11.42$, $p = .001$). The main effect indicated that those with positive reactions to the course reported exerting more effort on the course. The analysis for the student group also found a significant main effect for reactions ($F_{(1,94)} = 10.23$, $p = .002$). The main effect indicated that those students with positive reactions to the course reported exerting more effort on the course.

The ANCOVAs for the four dimensions of reactions found a significant main effect only for the perceived utility dimension ($F_{(1,94)} = 9.68$, $p = .002$). This finding indicates that the perceived utility dimension of the reactions variable is the most
important part of the reaction measure because it affects the amount of effort the trainee exerts to learn course content. If a trainee finds the training useful, the trainee is more likely to become engaged in the learning process. This finding also provides some further understanding of the reactions construct. As mentioned earlier, one of the problems with previous research on trainee reactions is lack of standardization in study design and measurement. The Future Research section below further discusses the need to establish a framework for the reactions construct. This finding suggests that perceived utility is an important dimension for inclusion in such a framework.

In summary, these analyses help to further our understanding of the relationships among pre-training motivation, reactions and effort. Reviewing these relationships is important because it demonstrates that pre-training motivation and reactions are important variables because they affect the level of effort trainees expend to learn the course material. These findings also suggest that it is worthwhile to pursue further research to better understand the nature of these relationships. The Limitations and Future Research sections below provide further discussion on how to better approach future research studies.

**Effort and Learning**

The relationship between effort and learning was not supported in this model. In the training courses completed in this study, perceived effort to learn the course material was not related to learning outcome scores. There are several possible reasons why the relationship was not significant here. The difficulty level of both the post-course
knowledge tests and the courses may have affected the outcomes. Further, the self-reported measure of effort may not be the ideal measurement.

First, there is no assessment of the difficulty of the post-course knowledge tests in these online training courses. That is, the post-course tests may not have been very difficult, and as such, differentiated effort levels may not have affected the learning measure. Some evidence supports this idea. The mean learning score was high (87 out of 100 possible points); indicating most of the trainees did well. As explained earlier, subject matter experts at the company wrote the post-course knowledge tests. These individuals were experts in the subject matter; however, they were not test development experts. Therefore, the post-course knowledge tests may not have reflected an in-depth knowledge of the course content and as a result, may not have been difficult.

There is also no measurement of the effectiveness of the design of the training. That is, there is no evidence to demonstrate that the design of these online training courses provides the optimum mix of learning activities to ensure learning occurs. Subject matter experts within the company designed these courses originally as correspondence courses. Technical experts then transferred the courses to an online format. The process of translating a course from one delivery method to another is called repurposing (Noe, 2002). Many organizations lack a systematic process when repurposing materials into an online format (Manton et al., 2004). Therefore, if the courses were effective as correspondence courses, they may not necessarily be effective as online courses. Brown and Ford (2002) argue that online training will only be effective if design strategies are used to maximize the active learning of the trainee. That is, in order for online training to be effective, the training must be designed to encourage
learner activity. As a result, failure to use expertise in the transition to online training may even have had a negative impact on the effectiveness of the courses. If the course design was not effective, differentiated levels of effort may not have had an impact on the learning outcomes.

Finally, this study used a self-report measure of effort because the technology of the course did not allow for measurement of actual effort. The use of self-report data may have caused inflated reports of effort as reflected by a high mean effort score (19.55 out of a possible 25). Self-report data are often considered unreliable because respondents may have reasons to not report accurately (Baldwin, 2000). For example, even though employees were notified that the study results were confidential, some may have thought that management would see their results and therefore, they wanted to report that they put forth effort in the course. The student group may have held similar beliefs about their instructors. In the Future Research section that follows, some suggestions on better measuring the effort variable are discussed.

Reactions and the Intent to Take Further Online Courses

Finally, the relationship between reactions to online training and the intent to pursue further online training courses was supported. This is an important finding because it supports the utility of measuring trainees' reactions to online training courses. While many previous studies have commented that reactions may be important because they can affect future enrollment rates, this relationship has not previously been examined. As discussed earlier, a forthcoming study by Brown (2005) that was not available when the present research was begun also provides support for this relationship.
Understanding the importance of positive trainee reactions is of particular importance in the online training environment for three reasons. First, organizations typically make a significant financial investment in the design and development of online training. Therefore, actual usage of the training is necessary in order to obtain a return on this investment. Second, online training courses are most often designed for training content that is available on an ongoing basis. That is, online training courses are typically offered more than once, making future course enrollment an important consideration. Finally, one of the advantages of online training is the capability to modify the training easily. Consequently, one can take advantage of training-related feedback to make more precise and timely changes to existing courses.

This finding also provides support for training designers to use formative evaluation. As discussed earlier, the purpose of formative evaluation is to identify problems with the instructional design or content of a course with the intention of making improvements to the training (Brown & Gerhardt, 2002). Understanding the impact that positive reactions have on future course enrollment emphasizes the need to modify training that trainees have not found enjoyable. Therefore, formative evaluation is a worthwhile pursuit. Tessmer (1995/1996) outlines a strategy to evaluate multi-media instruction such as online training.

Post-hoc Analysis of the TAM

The Technology Acceptance Model (TAM) was proposed as a theory to support the relationship between trainee reactions and intent to take further courses. TAM specifically discusses the two dimensions of perceived utility and perceived ease of use,
which were dimensions of reactions supported by the factor analysis in this study.

Previous research has found a relationship between each of these two dimensions and technology usage (Davis, 1989; Thong, Hong & Tam, 2002; Selim, 2003 and Martins & Kellermanns, 2004). A post-hoc analysis was conducted to explore the relationship between these two specific dimensions of reactions and intent to take further courses. Correlations with the other two dimensions of reactions were also examined. Table Thirteen presents the correlations.

Table Thirteen

Correlations of Reaction Dimensions and Intent to Take Further Courses

<table>
<thead>
<tr>
<th></th>
<th>Utility</th>
<th>Ease of Use</th>
<th>Format</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employee Intent</td>
<td>.53**</td>
<td>.32</td>
<td>-.15</td>
<td>.18</td>
</tr>
<tr>
<td>Student Intent</td>
<td>.55**</td>
<td>.06</td>
<td>.19</td>
<td>-.11</td>
</tr>
</tbody>
</table>

** p <.001

Interestingly, only the perceived utility dimension correlated significantly with intent to take further courses. Again, it seems that a trainee's perception of the usefulness of the training content is an important part of the reactions construct. Based on this research, a trainee's perception that the training is useful is more important for future course enrollments than the trainee's general satisfaction with aspects such as the design of the course.
VII. Limitations and Future Research

Limitations

Several limitations in this study are worth noting. First, the generalizability of the results of this study is limited due to the use of mostly student subjects. As the above analysis indicated, there were significant differences on the age, high school grade average and pre-training motivation variables between the students and employees in this study. These differences are likely to still exist if students are compared to employees of any other organization that offers online training courses.

A novelty effect may have influenced the outcomes of the study because the online training was a new experience for most of the participants (Shadish, Cook & Campbell, 2002). A majority (72%) of participants reported the training course in this study as their first online training experience. As such, reactions to the training were possibly inflated because trainees had no previous experience with online training to use as a benchmark. The novelty effect likely resulted in a restriction in the range of responses to the reaction measure. More experienced online trainees might have reported a broader range of reactions to the training. A broader range of reactions might have created more sensitivity to detect relationships with other variables in the study.

Voluntary enrollment in the courses for both student and employee subjects might have caused selection effects (Shadish, Cook & Campbell, 2002). As a result, those that participated in the study may differ from those that did not participate in the study on factors that could have influenced the outcomes of the study. For example, those enrolling in the training courses were interested in taking an online training course, which
may have caused elevated levels of pre-training motivation, or a more favorable reaction to the training. Moreover, those that had no interest in taking the course (low pre-training motivation) and those that may have been more critical of the training may have not enrolled in a course.

Attrition may have also affected the outcomes in this study (Shadish, Cook & Campbell, 2002). There were a significant number of employees who enrolled in the training that did not complete the training. During the data collection period, 107 employees completed the pre-course survey indicating an interest in participating in the training course and the study. However, only 26 (24%) employees completed the training and the post-course surveys.

To examine the differences between the employees that dropped out of the training courses and those that completed the training courses, a Hotelling's $T^2$ test was computed between the mean vectors across all variables in the pre-course survey. Table Fourteen presents the means and standard deviations of each group on these variables. This analysis found no significant differences between these two groups on the demographic variables, the pre-training motivation variable and the computer anxiety variable ($F = 1.54$, $p = .15$). However, it is possible that the groups differed on the outcome variables measured after the completion of the course.
Table Fourteen

Means and Standard Deviations for Employee Groups

<table>
<thead>
<tr>
<th>Variable</th>
<th>Employees who Dropped out of the Training</th>
<th>Employees who Completed the Training</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>Age</td>
<td>35.06</td>
<td>10.91</td>
</tr>
<tr>
<td>Gender</td>
<td>1.83</td>
<td>.38</td>
</tr>
<tr>
<td>Race</td>
<td>2.43</td>
<td>1.13</td>
</tr>
<tr>
<td>Education</td>
<td>3.37</td>
<td>1.41</td>
</tr>
<tr>
<td>Grade point average</td>
<td>8.69</td>
<td>1.95</td>
</tr>
<tr>
<td>Pre-training motivation</td>
<td>16.94</td>
<td>2.27</td>
</tr>
<tr>
<td>Computer anxiety</td>
<td>9.11</td>
<td>4.40</td>
</tr>
</tbody>
</table>

Future Research

Several of the limitations in this study provide direction for future research. The following discussion suggests future research in four areas. First, research involving mandatory training is proposed. Next, suggestions are provided on examining attrition problems in voluntary online training courses, followed by suggestions on improving study measures. Finally, further application of the Theory of Reasoned Action is recommended.

Research with a Required Training Course

A study with more control over the enrollment and completion of the online training course might have produced different results. Future research should test the proposed model in an environment where employees are required to complete the training.
course as part of their job, or where the employees receive some other type of tangible outcome for completing the training. If the training is required or if there are incentives to encourage completion of the course, trainees that cut across the full range of the study variables are likely to enroll in and complete the training course. This is especially the case for computer anxiety and pre-training motivation variables. Moreover, if training completion is required, there is a greater likelihood that the sample will include trainees who had positive and negative reactions to the training. Finally, if the training is relevant and important for the trainees, they may exert more effort to learn the course content and demonstrate a broader range of learning outcomes. In fact, research has shown that trainees have better learning outcomes when they are told that they are accountable for learning the course material (DeMatteo et al., 1997/98).

Examining Attrition

The attrition rate in this study also raises an interesting future research question. Completion rates in voluntary online training courses are a concern for many organizations (Welsh et al., 2003). However, research has yet to examine the factors that are barriers to completing voluntary online training courses. Identifying these factors could prove valuable to organizations to help develop strategies to increase the use and completion of voluntary online training courses. Negative trainee reactions may be one of many different factors that act as a barrier to completing a course. If trainees with negative reactions to the training choose not to complete the training, reactions may indeed play a role in the effectiveness of online training. However, there are possibly many other reasons why a trainee may not complete an online training course.
To provide some insight about the reasons trainees failed to complete the course, a qualitative, exploratory survey was sent to those company employees in this study that enrolled in the training but did not complete the training course during the data collection period. Although the response rate for this survey was only 10.6% (n=20), the responses do provide some ideas for pursuing further research. Of those that responded, 12 (60%) had already started the course. All of those that responded that were still employed by the company planned to eventually finish the course.

Overall, the reasons for not starting or not completing the training were similar. Appendix E provides a summary of responses to the survey. Most respondents cited either work-related issues or personal issues. The primary obstacle appears to be time. Some examples of responses that address work-related issues include "I have had too many new responsibilities at work" and "I have been working out of state and it's hard to find the extra time." Some examples of responses that address personal issues include "I underestimated other things in my life so I never get to the course" and "I had a baby and bought a new house."

These responses suggest that perhaps future research needs to address some of the contextual issues that surround completion rates in voluntary online training courses. Contextual factors are those that evolve out of the environment within the organization and are believed to affect training effectiveness beyond training design and individual differences of trainees (Quinones, 1997). For example, at the company in this research study, trainees were expected to complete the training on their own time. They were not given time during their workday to complete the training. The environment of the
organization was not structured to support the training, which may have led to the low completion rates.

Even if an organization designs effective training courses, these contextual issues may be barriers to the completion of courses. Research to reveal these barriers would be tremendously useful for organizations planning to offer voluntary online training courses. Empirically supported guidelines to create an environment to promote the completion of online training courses could help organizations achieve a higher return on their investment in online training.

The survey also asked the participants to provide their reactions to the parts of the training course that they had completed. While the number that completed this part of the survey was small (n=12), participants generally had positive reactions to the course. Interestingly, they all either agreed or strongly agreed that the course content was relative to their job. And 11 of the 12 respondents either agreed or strongly agreed that the course would help them improve their job performance. These responses seem to indicate that the contextual barriers discussed above may be the more important variables where research needs to focus. That is, although these respondents felt the content of the course was beneficial to their job performance, they still did not complete the course for unknown reasons.

Measurement Issues

As mentioned earlier, one factor that may have influenced the outcomes in this study could be the difficulty level of the course. Because previous research has not
looked at the impact of course difficulty on training-related outcomes, researchers should use the difficulty of the course as a control variable in their research. For example, Brunken et al. (2003) provide a full discussion on the application of Cognitive Load Theory to the measurement of difficulty in multimedia learning experiences.

The above discussion also mentions the importance of measuring reactions and motivation throughout the progression of the training course. Motivation, reactions and effort may interact throughout a course to affect the ultimate learning outcomes. As Ajzen and Fishbein (1974) point out, one challenge in the TRA is that intentions may change after they have been measured. As an individual obtains more information about the act in question, their attitude may change and as a result, their intentions may change. However, pre and post course measurement of these constructs fails to take into account changes during progression through the course. As technology becomes more sophisticated, researchers should be able to find ways to measure these constructs at varying times during the training. For example, researchers might be better able to measure actual effort by using technology to capture time-on-task or the number of times a trainee viewed a certain section of the course.

Changing the timing of the measurement of the constructs in this study may also allow researchers to develop a model that more closely corresponds to the TRA. As mentioned earlier, the model tested in this research differs from the TRA because it does not posit a sequential relationship across attitude, intention, and behavior. This is so because reaction attitudes do not exist prior to training and are thus unable to influence the intention of pre-training motivation. Measuring motivation levels during the training course as intentions develop in response to reactions may confirm that the sequential
attitude-intention-behavior relationship does exist. That is, as opposed to looking only at pre-training motivation to learn, the motivation to learn at different times during the training course may better represent the intention that is influenced by reaction attitudes.

Further, measurement of a trainee's reaction to the training course prior to course completion can help to eliminate concerns of causality. That is, if a trainee's reaction to the course is recorded prior to the trainee receiving their post-course test scores, the concern that the trainee's performance influenced the trainee's reactions to the course are lessened. The influence of course performance on ratings of course effectiveness is a concern widely debated in the education literature. Research has consistently shown a moderate positive relationship between student reactions and student grades, and this relationship has been stronger when students know their final grade before completing the rating forms (Arthur, et al., 2003). This was not a concern in this study because there was not a statistically significant relationship between trainee reactions and learning (r = .04). However, future research that measures reactions prior to trainees receiving their scores on the learning outcome could eliminate this concern.

Finally, the post-hoc analysis of the relationships with the four dimensions of reactions suggests further research is needed to develop a better reactions measure. While several researchers have discussed the importance of the multi-dimensionality of the reactions variable, there is no generally accepted theoretical framework that defines the structure of reactions. Establishing such a framework is a worthwhile pursuit for future research. More clarity in the reactions construct could lead to more links with specific outcomes. Further, a universal set of meaningful reaction measures would be beneficial to both organizational trainers and training researchers. Organizational trainers
could better track the effectiveness of their training and training researchers could better compare the findings of various studies. Researchers have started to more vigorously explore the nature of reactions, and this should lead to a more acceptable definition as well as better measures of reactions (see for example Morgan & Casper, 2000 and Brown, forthcoming).

Further Application of the TRA

Finally, TRA could be further applied to a more complete model by examining the relationship between the intention to take further courses and actual future course enrollment. In the model, reactions represent an attitude that influences the intention to take further courses. While it is helpful for an organization to know that the trainee's reaction to a course is related to their intention to take further courses, it would prove even more valuable to know whether that intention actually results in future course enrollment.

Conclusion

Despite the potential value of training evaluation, few organizations invest the time and effort needed to fully evaluate training courses. If organizations do choose to evaluate training, most collect immediate post-course trainee reactions because they are easy to obtain. Unfortunately, most times this is the only measure they use to evaluate the effectiveness of their training courses in spite of the fact that research has generally failed to find utility in this measure. While researchers have consistently refuted the idea that trainee reactions should be taken as a surrogate for learning, organizations should not
rush to the conclusion that reactions as a measure of training course evaluation provide little, if any, value. Online training in particular could benefit from a better understanding of the utility of a trainee reaction measure. This is especially so because trainee reactions are easy to collect in an online training environment as training designers can simply add a reactions survey as the final page on an online training course.

While the model proposed in this study was not fully supported, the results of this study provide useful guidance for online training designers and researchers. For example, this study found that computer anxiety is related to pre-training motivation in online training courses. Further, positive trainee reactions and pre-training motivation were found to relate directly to the amount of effort trainees expended to learn the content of the training course. In fact, this study provided evidence that satisfaction with the course format dimension of trainee reactions moderates the relationship between pre-training motivation and effort. This finding suggests that trainee reactions play an important role in the effectiveness of online training courses.

This research has also provided support to the theory that reactions to online training can influence the future utilization of online training courses. Finally, this study found support for the theory that trainee reactions are a multi-dimensional construct. While research is still far from creating a universal set of reaction dimensions, this research provides further guidance in understanding potential dimensions of trainee reactions in the online training environment.
VIII. Works Cited


Appendix A

Pilot Study Survey Results

A pilot study was conducted to select the items for the pre-training motivation and computer anxiety. The subjects for this study were students enrolled in management courses (n=127).

Pre-training Motivation Scale

<table>
<thead>
<tr>
<th>Items</th>
<th>Pre-Training Motivation Factor</th>
<th>Other Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am motivated to learn the material in this course.</td>
<td>.595</td>
<td>.512</td>
</tr>
<tr>
<td>2. I will try to learn as much as I can from this course.</td>
<td>.420</td>
<td>.720</td>
</tr>
<tr>
<td>3. I will get more from this course than most people.</td>
<td>.370</td>
<td>.701</td>
</tr>
<tr>
<td>4. I will try harder if I can’t understand some part of this course.</td>
<td>.625</td>
<td>.403</td>
</tr>
<tr>
<td>5. I will put more effort into this course than most people.</td>
<td>.898</td>
<td>.116</td>
</tr>
<tr>
<td>6. I believe I can learn the material presented in this course.</td>
<td>-.042</td>
<td>.829</td>
</tr>
<tr>
<td>7. I am willing to exert considerable effort to learn the content of this course.</td>
<td>.866</td>
<td>.176</td>
</tr>
</tbody>
</table>

Items 1,4,5 and 7 were selected for the scale, $\alpha = .80$, n = 127
Computer Anxiety Scale

<table>
<thead>
<tr>
<th>Items</th>
<th>Computer Anxiety Factor</th>
<th>Other Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I feel confident and relaxed while working on a computer.</td>
<td>.425</td>
<td>.587</td>
</tr>
<tr>
<td>2. I get more confused the harder I work at learning computers.</td>
<td>.499</td>
<td>.395</td>
</tr>
<tr>
<td>3. I sometimes think that I am too old to learn about computers.</td>
<td>.388</td>
<td>.465</td>
</tr>
<tr>
<td>4. I sometimes think, “Computers don’t like me.”</td>
<td>.462</td>
<td>.332</td>
</tr>
<tr>
<td>5. I always have problems working on computers.</td>
<td>.375</td>
<td>.725</td>
</tr>
<tr>
<td>6. I can usually manage to solve computer problems by myself.</td>
<td>.138</td>
<td>.738</td>
</tr>
<tr>
<td>7. Computers intimidate and threaten me.</td>
<td>.651</td>
<td>.487</td>
</tr>
<tr>
<td>8. I still have a fear of computers, even though they are valuable and necessary.</td>
<td>.778</td>
<td>.367</td>
</tr>
<tr>
<td>9. I am confident that I can learn computer related skills.</td>
<td>.110</td>
<td>.679</td>
</tr>
<tr>
<td>10. I have avoided computers because I don’t understand them.</td>
<td>.734</td>
<td>.258</td>
</tr>
<tr>
<td>11. Computers are strange and frightening.</td>
<td>.801</td>
<td>.255</td>
</tr>
<tr>
<td>12. I don’t feel like I am part of the computer revolution that is going on.</td>
<td>.853</td>
<td>.149</td>
</tr>
<tr>
<td>13. I feel left out of the large group of people that are learning about and using computers.</td>
<td>.851</td>
<td>.230</td>
</tr>
<tr>
<td>14. I feel like a technological outcast because I don’t use computers very often.</td>
<td>.732</td>
<td>.234</td>
</tr>
</tbody>
</table>

Items 8, 10, 11, 12 and 13 were selected for this scale, $\alpha = .91$, $n = 127$
Appendix B

Measures

Demographic Information
Age
Gender
Race
Education
Self-Reported High School grade point average

Computer Anxiety Scale
I have avoided computers because I don’t understand them.
I don’t feel I am part of the computer revolution that is going on.
I still have a fear of computers, even though they are valuable and necessary.
Computers are strange and frightening.
I feel left out of the large group of people that are learning about and using computers.

Pre-training Motivation Scale
I am motivated to learn the material in this course.
I will try even harder if I can’t understand some part of this course.
I will put more effort into this course than most people.
I am willing to exert considerable effort to learn the content of this course.

Perceived Effort
I put a lot of effort into this course.
I tried very hard on this course.
It was important to me to do well in this course.
I didn’t put much energy into this course.
I didn’t try very hard to do well in this course.

Reactions
    Content Sub-scale
The course content was clear.
I could easily understand the course content.
The instructional material was comprehensive.
The content of the course helped me learn important concepts.

    Format Sub-scale
I was able to navigate through the course content in the order I desired.
I believe that a good variety of displays (text, graphs, etc.) were used.
The learning was enhanced by the graphics (pictures, graphs etc.).
The course was enhanced by the use of sound and voice.
The text on the computer screen was easy to read.
Ease of Use Sub-scale
Overall, the course was user-friendly.
Overall, I found the course easy to use.
I was able to complete the course without additional help.

Utility Sub-scale
I believe the course objectives closely matched my idea of what I expected would be taught.
This course will help me improve my performance on my job.
I believe that the course content is relevant to my job.

Overall Satisfaction
Overall, I found the content of the course valuable.
Overall, I was very satisfied with the presentation of the content of the course.
Overall, I had a very positive learning experience.

Intent to Take Further Courses– Employees
If I had an opportunity to take another course via the Internet, I would gladly do so.
I plan to take another course through the COMPANY.
I will recommend this course to other people.

Intent to Take Further Courses– Students
If I had an opportunity to take another course via the Internet, I would gladly do so.
Based on my experience with this course, I plan to take another online course.
I will recommend online courses to other people.
Appendix C

Participant Correspondence

**Invitation to employees participate in pre-course survey:**

I am contacting you on behalf of COMPANY NAME. My name is Lori Long, and I am helping COMPANY NAME evaluate the courses in the Institute Online. As part of this evaluation, I invite you to provide feedback about what you like and don’t like about the online course you will be taking. This feedback will be used to improve the course.

The evaluation will include a pre-course survey, a short online test and a post-course survey. The purpose of the pre-course survey and the short test are to learn about you and your interest in the online courses. You will receive an email with instructions for completing the short test shortly after you complete the pre-course survey. After you complete the course, you will receive the post-course survey that is used to collect feedback about your experiences with the course.

All of the feedback you provide will be kept completely confidential. Only the compiled results will be shared with COMPANY NAME. Results of the study may also be published in an academic journal, however, individual participants will not be identified in any publication.

To voluntarily participate in this evaluation study, use this link to complete the pre-course survey (which takes about five minutes to complete):
(link entered here)

***** $50 Prize Drawing *****
If you complete all three parts of the evaluation (the pre-course survey, short online test and post-course survey) you will be entered into a drawing to receive a $50 gift certificate from [www.giftcertificates.com](http://www.giftcertificates.com). The gift certificate can be redeemed with hundreds of online retailers.

If you have any questions, please contact me at ldlong@cox.net or at (216) 319-1091. You may also contact Dick Jones at (COMPANY CONTACT INFORMATION).

If you have questions about Kent State University's rules for research, please call Dr. John L. West, Vice President and Dean, Division of Research and Graduate Studies (Tel. 330.672.0700).

Thank you for your time. Lori Long
E-mail to invite to complete short online test:

Thank you for completing the first part of the Institute Online Evaluation Study, the pre-course survey.

The second part of the overall evaluation study involves a short (8 minute) test of general knowledge. This test is used to better understand your training-related aptitude and will be used to help us better understand how effective the online courses are.

The results of this short test are sent directly to me and will be used only in my analyses. COMPANY NAME will not see your individual results of this short test.

Remember, if you complete all three parts of the evaluation (the pre-course survey, short online test and post-course survey) you will be entered into a drawing to receive a $50 gift certificate from www.giftcertificates.com. The gift certificate can be redeemed with hundreds of online retailers.

To voluntarily continue to participate in this evaluation study, use this link to start the online test:
(insert link here)

If you have any questions, please contact me at Ldlong@cox.net, or at (216) 319-1091. You may also contact (COMPANY CONTACT INFORMATION).

If you have questions about Kent State University's rules for research, please call Dr. John L. West, Vice President and Dean, Division of Research and Graduate Studies (Tel. 330.672.0700).

Thank you for your time. Lori Long
**Invitation to complete Post-course survey**

The final part of the overall evaluation study is a post-course survey that is used to collect feedback about your experiences with the course.

As always, any information collected as part of the evaluation study will only be shared in compiled form with COMPANY NAME.

If you complete all three parts of the evaluation (the pre-course survey, short online test and post-course survey) you will be entered into a drawing to receive a $50 gift certificate from [www.giftcertificates.com](http://www.giftcertificates.com). The gift certificate can be redeemed with hundreds of online retailers.

To voluntarily continue to participate in this evaluation study, use this link to start the post-course survey (which takes about 5 minutes to complete):

(insert link here)

If you have any questions, please contact me at ldlong@cox.net, or at (216) 319-1091. You may also contact (COMPANY CONTACT INFORMATION).

If you have questions about Kent State University's rules for research, please call Dr. John L. West, Vice President and Dean, Division of Research and Graduate Studies (Tel. 330.672.0700).

Thank you for your time.  Lori Long
E-mail and Instructions for Students

Thank you for your interest in participating in the COMPANY NAME Online Evaluation Study. To voluntarily participate in this evaluation study, please follow the attached instructions. Your Research ID number is __________.

Please note that the time estimates to complete the training are based upon reports of previous training participants. Each individual may take more or less time to complete the training. You do not need to complete the entire training course in one sitting, you are able to bookmark your place and return at any time.

If you would like to withdraw from the study, you may do so at any time. However, you must complete the training and the surveys to receive credit for the assignment. The training and surveys must be completed by __________.

If you have any questions, please contact me via e-mail or at 216.319.1091.

If you have questions about Kent State University's rules for research, please call Dr. John L. West, Vice President and Dean, Division of Research and Graduate Studies (Tel. 330.672.0700).

Thanks for your time and participation. Lori Long
COMPANY NAME Online Evaluation Study Instructions

1. SET-UP PASSWORD:
   • Go to INSERT LINK select “Register” in top left and complete the required sections. Write down the username and password you set-up.

2. REGISTER FOR COURSE
   • Go to INSERT LINK and use your username and password to log-in (left side of the screen).
   • Select “enroll” from the top middle toolbar. Scroll down to the Management Course and select the box beside the course title. Scroll to the bottom of the page and click on the Request Enrollment button.

3. COMPLETE PRE-COURSE SURVEY
   • Go to: INSERT LINK
   • Your research ID number is in the e-mail you received with this document.

4. BEGIN THE TRAINING
   • You will receive an e-mail message from COMPANY indicating your course has been approved (Please note: Course approvals are completed between 8am-5pm Mon-Fri. If you register for a course on the weekend or in the evening, you will not receive a confirmation until the next business day).
   • Go to INSERT LINK and use the username and password you created to log-in and begin the course.
     o Note: You do not need to complete the course in one sitting. You may start and stop the course and your place will be bookmarked. However, you need to complete the entire section and the quiz at the end of each section before you can move on to the next section.

5. COMPLETE POST-COURSE SURVEY
   • After completing the training course, go to: INSERT LINK. Your research ID number is in the e-mail you received with this document.

6. COMPLETE SHORT ONLINE TEST
   • After completing the course and the post-course survey, you will receive an e-mail message from Pan Testing with instructions on completing the short online test.

If you have any questions, please contact Lori Long at LkLong@kent.edu, or at (216) 319-1091.

By registering for and completing the training course, you are agreeing to participate in this study. You may withdraw from the study at any time. If you have questions about Kent State University’s rules for research, please call Dr. John L. West, Vice President and Dean, Division of Research and Graduate Studies (Tel. 330.672.0700).
Appendix D

Pre-Course Survey and Post-Course Survey - Employees

Scales (shown in parenthesis following each item):
Computer Anxiety Scale (CANX)
Pre-training Motivation Scale (PTM)
Perceived Effort (PE)
Reactions
  Content Sub-scale (CONTENT)
  Format Sub-scale (FORMAT)
  Ease of Use Sub-scale (EOU)
  Utility Sub-scale (UTILITY)
  Overall Satisfaction (OVERALL)
Intent to Take Further Course (INTENT)

Pre-Course Survey:

Please provide the following demographic information by filling in the blank box or selecting the appropriate radio button. (Reminder: Your employee number is for tracking purposes only. All responses will remain confidential.)

1. Employee number ______________________

2. Age _____

3. Gender     (1) Female   (2) Male

4. Race       (1) Black (not Hispanic)  (2) White (not Hispanic)  (3) Hispanic  (4) Asian
              (5) American Indian or Alaskan Native  (6) Other

5. Education: (1) Did not graduate high school  (2) High school graduate (or GED)  (3) Some college
               (4) Associates degree  (5) Bachelor’s degree  (6) Graduate degree

6. What was your high school grade point average?
   (1) A+   (2) A   (3) A-
   (4) B+   (5) B   (6) B-
   (7) C+   (8) C   (9) C-
   (10) D+  (11) D  (12) D-
   (13) F

7. Years of experience as a tree care professional (including your time with COMPANY):
   __________

8. How many years have you worked at COMPANY? __________
9. How many training courses have you taken through the *COMPANY* prior to this course? 0 1 2 3 4 5 or more

10. How many online (or web-based) training courses or classes have you taken (other than from *COMPANY*)? 0 1 2 3 4 5 or more

Please select the corresponding radio button that indicates how much you agree or disagree with each statement below.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. I am motivated to learn the material in this course. (PTM)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. I have avoided computers because I don’t understand them. (CANX)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. I don’t feel I am part of the computer revolution that is going on. (CANX)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. I will try even harder if I can’t understand some part of this course. (PTM)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. I still have a fear of computers, even though they are valuable and necessary. (CANX)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16. Computers are strange and frightening. (CANX)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17. I will put more effort into this course than most people. (PTM)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. I feel left out of the large group of people that are learning about and using computers. (CANX)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. I am willing to exert considerable effort to learn the content of the course. (PTM)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
Post-Course Survey:

Please fill-in the blank box with your employee number and then select the corresponding radio button that indicates how much you agree or disagree with each statement below. (Reminder: Your employee number is for tracking purposes only. All responses will remain confidential.)

Employee number ______________________

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The course content was clear. (CONTENT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. I was able to navigate through the course content in the order I desired. (FORMAT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. I could easily understand the course content. (CONTENT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4. I believe that a good variety of displays (text, graphs, etc.) were used. (FORMAT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5. I put a lot of effort into this training course. (PE)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. The learning was enhanced by the graphics (pictures, graphs etc.). (FORMAT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Overall, the training course was user-friendly. (EOU)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. I tried very hard on this training course. (PE)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. The instructional material was comprehensive. (CONTENT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10 Overall, I found the course easy to use. (EOU)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11. It was important to me to do well in this training course. (PE)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. The content of the course helped me learn important concepts. (CONTENT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. I believe the course objectives closely matched my idea of what I expected would be taught. (UTILITY)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>---</td>
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<td>-----------------------------</td>
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<td>-------------------</td>
</tr>
<tr>
<td>14. The course was enhanced by the use of sound and voice. (FORMAT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15. I didn’t put much energy into this training course. (PE)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16. This course will help me improve my performance on my job. (UTILITY)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17. The text on the computer screen was easy to read. (FORMAT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. I believe that the course content is relevant to my job. (UTILITY)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19. I didn’t try very hard to do well in this training course. (PE)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. I was able to complete the course without additional help. (EOU)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21. Overall, I found the content of the course valuable. (OVERALL)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22. Overall, I was very satisfied with the presentation of the content of the course. (OVERALL)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23. Overall, I had a very positive learning experience. (OVERALL)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24. If I had an opportunity to take another course via the Internet, I would gladly do so. (INTENT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25. I plan to take another course through the COMPANY. (INTENT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26. I will recommend this course to other people. (INTENT)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

*What did you like best about this course?*

*What did you like least about this course?*

*Additional Comments:*
Pre-Course Survey and Post-Course Survey- Students

Scales (shown in parenthesis following each item):
Computer Anxiety Scale (CANX)
Pre-training Motivation Scale (PTM)
Perceived Effort (PE)
Reactions
  Content Sub-scale (CONTENT)
  Format Sub-scale (FORMAT)
  Ease of Use Sub-scale (EOU)
  Utility Sub-scale (UTILITY)
  Overall Satisfaction (OVERALL)
Intent to Take Further Course (INTENT)

Pre-Course Survey:

Please provide the following demographic information by filling in the blank box or selecting the appropriate radio button. (Reminder: Your Research ID number is for tracking purposes only. All responses will remain confidential.)

1. Research ID Number ______________________

2. Age ____

3. Gender   (1) Female   (2) Male

4. Race    (1) Black (not Hispanic)   (2) White (not Hispanic)   (3) Hispanic   (4) Asian
            (5) American Indian or Alaskan Native   (6) Other

5. Education:    (1) Did not graduate high school   (2) High school graduate (or GED)   (3)
                  Some college   (4) Associates degree   (5) Bachelor’s degree   (6) Graduate degree

6. What was your high school grade point average?
   (1) A+   (2) A    (3) A-
   (4) B+   (5) B    (6) B-
   (7) C+   (8) C    (9) C-
   (10) D+  (11) D   (12) D-
   (13) F

7. Are you currently an undergraduate or MBA student?

8. If you are an undergraduate student, what was your SAT (or ACT) score?

9. If you are a MBA student, what was your GMAT (or GRE)?
10. How many online (or web-based) training courses or classes have you taken (other than from COMPANY)? 0  1  2  3  4  5 or more

Please select the corresponding radio button that indicates how much you agree or disagree with each statement below.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. I am motivated to learn the material in this course. (PTM)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. I have avoided computers because I don’t understand them. (CANX)</td>
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<td>4</td>
<td>5</td>
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<td>13. I don’t feel I am part of the computer revolution that is going on. (CANX)</td>
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<td>3</td>
<td>4</td>
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</tr>
<tr>
<td>16. Computers are strange and frightening. (CANX)</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>17. I will put more effort into this course than most people. (PTM)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. I feel left out of the large group of people that are learning about and using computers. (CANX)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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</tr>
<tr>
<td>19. I am willing to exert considerable effort to learn the content of the course. (PTM)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
**Post-Course Survey:**

Please fill-in the blank box with your employee number and then select the corresponding radio button that indicates how much you agree or disagree with each statement below. (Reminder: Your Research ID number is for tracking purposes only. All responses will remain confidential.)

Research ID Number ______________________

<table>
<thead>
<tr>
<th></th>
<th>Content (CONTENT)</th>
<th></th>
<th>Format (FORMAT)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The course content was clear.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>I was able to navigate through the course content in the order I desired.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>I could easily understand the course content.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>I believe that a good variety of displays (text, graphs, etc.) were used.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>I put a lot of effort into this training course.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>The learning was enhanced by the graphics (pictures, graphs etc.).</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Overall, the training course was user-friendly.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>I tried very hard on this training course.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>The instructional material was comprehensive.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Overall, I found the course easy to use.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>It was important to me to do well in this training course.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>The content of the course helped me learn important concepts.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>I believe the course objectives closely matched my idea of what I expected would be taught.</td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Agree</td>
<td>Neither Agree nor Disagree</td>
<td>Disagree</td>
<td>Strongly Disagree</td>
<td></td>
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<tr>
<td>14.</td>
<td>1</td>
<td>2</td>
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<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td>16.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>1</td>
<td>2</td>
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</table>

**What did you like best about this course?**

**What did you like least about this course?**

**Additional Comments:**
Appendix E

Exploratory Survey of Employees Who Did Not Complete the Training

Survey Participation:

- Survey sent to 188 participants who had not yet completed training (note: originally sent to 204, but 16 were returned with e-mail addresses no longer working.)
- 20 responded to survey (10.6%)
- Of the 20, 12 (60%) had started the course.
- Of the 20, 16 intended to complete the training course (4 had left the company)

Reasons for not starting course:

- I underestimated other things in my life so I never get to the course.
- I have moved and just now getting settled in.
- Not sure how to enroll in the course.
- I have had too many new responsibilities at work
- No longer with the COMPANY (3)

Reasons for not completing course:

- I had some personal issues, my mother and mother-in-law died
- I've been busy with work and my family
- Just finding time to sit down to read it and understand it
- When I return home from work I spend time with my 11 month old daughter until she goes to bed at 8pm and then usually go to bed shortly after.
- I had a baby and bought a new house.
- Time, generally do at work on breaks. I am busier now, but trying to finish.
- Work and family obligations/time constraints.
- I forgot I was doing it.
- I have been working out of state and its hard to find the extra time.
- Nothing, I need to apply myself in the near future and finish.
- Work
- My computer has not been reliable.
- No longer with the COMPANY (1)
Reactions to training completed so far: (n=12)

Responses reported in %.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Avg</th>
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<tr>
<td>The course content was clear.</td>
<td>50</td>
<td>50</td>
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<td>1.5</td>
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<td>I could easily understand the course content.</td>
<td>40</td>
<td>30</td>
<td>30</td>
<td></td>
<td>1.9</td>
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<tr>
<td>The instructional material was comprehensive.</td>
<td>30</td>
<td>40</td>
<td>20</td>
<td>10</td>
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<td>The content of the course helped me learn important concepts.</td>
<td>80</td>
<td>20</td>
<td></td>
<td></td>
<td>1.4</td>
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</table>

**Satisfaction with Course Format**

<p>| I was able to navigate through the course content in the order I desired. | 50 | 20 | 30 | | 1.8 |
| I believe that a good variety of displays (text, graphs, etc.) were used. | 50 | 50 | | | 1.5 |
| The learning was enhanced by the graphics (pictures, graphs etc.). | 60 | 40 | | | 1.4 |
| The course was enhanced by the use of sound and voice. | 10 | 10 | 70 | 10 | 2.9 |
| The text on the computer screen was easy to read. | 30 | 30 | 30 | 10 | 2.3 |</p>
<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Avg</th>
</tr>
</thead>
</table>

**Satisfaction with Course Ease of Use**

| Overall, the training course was user-friendly. | 50  | 30  | 10   |          |                  | 1.5 |
| Overall, the training course was easy to use.   | 50  | 20  | 30   |          |                  | 1.5 |

**Perceived Utility/Usefulness of Course**

| I believe the course objectives closely matched my idea of what I expected would be taught. | 60  | 20  | 20   |          |                  | 1.6 |
| This course will help me improve my performance on my job.                                   | 60  | 30  | 10   |          |                  | 1.3 |
| I believe that the course content is relevant to my job.                                     | 70  | 30  |      |          |                  | 1.3 |