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THE EFFECTS OF LEARNER CONTROL AND INDIVIDUAL DIFFERENCES ON LEARNING OUTCOMES

By

Marcia Jeanette Simmering

A DISSERTATION

Submitted to
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ABSTRACT

THE EFFECTS OF LEARNER CONTROL AND INDIVIDUAL DIFFERENCES ON LEARNING OUTCOMES

By

Marcia Jeanette Simmering

The degree to which individuals learn in a training situation is an important consideration for research and practice. In this dissertation, I examine the effects of learner control and individual differences on learning outcomes. Specifically, I predicted that learners' personality characteristics and attitudes would have differing effects on motivation to learn and learning depending on the degree to which learners have control over the training. I examined this fundamental question of what leads to learning in the context of a relatively new instructional medium—web-based training.

One-hundred eighty-nine students participated in web-based training to improve grammar skills and were evaluated on post-tests and subsequent performance on a writing assignment. Results of this study indicated that mastery oriented individuals were more motivated to learn. Additionally, perceptions of the legitimacy of training were related to motivation to learn and were moderated by the amount of learner control in training. A predicted relationship between motivation to learn and learning was not found with self-report measures of motivation to learn. However, two unobtrusive measures of motivation to learn were positively related to training. Finally, learning was significantly related to transfer of training.

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INTRODUCTION

Learning is a key issue in understanding the effectiveness of training in business organizations. The Bureau of Labor Statistics estimated that U.S. companies spent over $55 billion in training and development in 1996 (http://www.astd.org/virtual_community/comm_trends/98soi_slide_train_ expenditures. html). With such an investment in training and developing employees, evaluation is a crucial issue. Evaluation of training is an attempt to answer two questions: (1) Did learning occur? and (2) Did transfer of training occur (Kraiger, Ford, and Salas, 1993)? The principal concern of training evaluation is whether or not learning occurred.

Gagne (1985) defines learning as "a change in human disposition or capability that persists over a period of time and is not simply ascribable to processes of growth" (p. 2). Gagne further notes that learning exhibits itself as a change in behavior that is evidenced after an individual has been put in a learning situation. In order to improve future training effectiveness, it is important to understand what characteristics of training and trainees contribute to learning.

My main research question in this dissertation is aimed at understanding the extent to which individual differences of learners impact motivation to learn and learning in different training conditions. Specifically, I expect personality characteristics and attitudes of learners to have differing impact on motivation to learn depending on the degree to which learners have control over the training. I also expect that motivation to learn will be positively related to learning. I examine this fundamental question of what leads to learning in the context of a

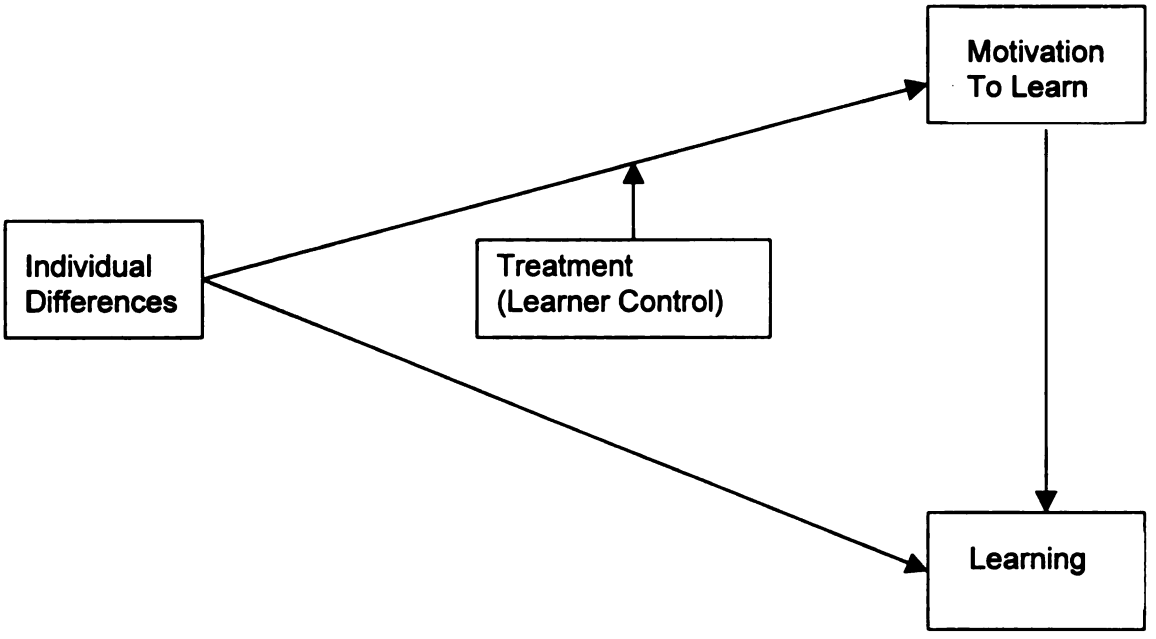
relatively new instructional medium—web-based training. I discuss a theoretical framework, my research model, features of web-based training, and hypotheses.

The overview of my research model is presented in Figure 1. Learners' individual differences are expected to have direct effects on motivation to learn, which in turn will have a positive relationship with learning. The individual differences of learners are also hypothesized to have direct effects on learning. The learning context, or more specifically, learner control of training, is expected to have a moderating effect on the relationship between the individual differences and motivation to learn, such that in situations of high learner control, individual differences will have a stronger effect.

There are three expected contributions of this dissertation to the existing literature on learning. First, I examine individual differences in the learning situation, which expands on existing research in personality, especially in the context of person-situation interaction. Second, I investigate levels of learner control, a topic that has received attention in educational literature but has been neglected in organizational training literature. Third, I examine learning in the context of a new instructional medium, web-based training, which will provide empirical data regarding the effectiveness of this technologically advanced training medium.

Figure 1

Conceptual Model



LITERATURE REVIEW

Two theories guide my investigation of individual differences and learner control in a web-based training context. First, a general aptitude theory explains the relationship between different levels of learner control and the effects of individual differences on learning. Specifically, aptitude theory emphasizes the importance of investigating aptitude-treatment interactions (ATI) (Snow & Lohman, 1984). Second, Mischel's (1977) work on person-situation interaction guides the hypotheses regarding how the individual differences and treatment will interact. Within this theoretical framework, I draw from models of instructional design and organizational training to explain the roles of specific constructs.

An aptitude theory describes inner environments (individual differences of learners) and outer environments in which the aptitude operates (Snow & Lohman, 1984). Snow (1978) defines aptitudes as "student characteristics that predict response to instruction under a given instructional treatment" (p. 227). Although the focus of aptitudes has traditionally been on cognitive processes, they may also encompass personality and attitudes that contribute to or detract from learning (Snow, 1978; Snow & Lohman, 1984). In the context of learning from instruction, aptitude theory specifies that individual aptitudes must be matched to instructional demands in order for learning to occur. Accordingly, an aptitude-treatment interaction, in which aptitudes are directly related to learning outcomes and are also moderated by the training treatment, is implied (Snow & Lohman, 1984).

Aptitude-treatment interactions occur through aptitude processes, which are defined as predictable, directed changes in psychological functioning by which some individual learners adapt to the demands of instructional conditions, while other learners do not (Snow & Lohman, 1984). For example, a learner who is overwhelmed with information may not have the cognitive capabilities to sort and order information in a way that facilitates learning. However, if the learning situation (or treatment) is such that the information is presented in a very structured manner, the individual may have increased learning.

The relevance of aptitudes is in their effect on information processing which is related to learning outcomes (Snow, 1978). These processes are influenced not only by individual differences, but also by situational demands (the treatment). Differences in aptitude processes could occur due to the speed or efficiency, the sequencing, and the higher order strategic processes used to digest information presented in a learning situation (Snow & Lohman, 1984). Therefore, if the treatment can accommodate these differences in information processing, the situation can facilitate learning. In conclusion, Snow (1978) notes that the treatment should be designed to capitalize on a learner's aptitudes and compensate for the learner's inaptitudes.

Aptitude theory provides insight into why individual differences constructs and treatment conditions will interact. Aptitude theory is similar to Mischel's (1977) work on person-situation interaction. Mischel (1977) theorizes that different environments, or situations, influence characteristics of the person such that the individual may think and act differently in various situations. The situation

can also be conceptualized as a stimulus or treatment, which can apply to training research.

Although not specifically aimed at training research, this broad theory applies to many work situations, which can include organizational training. Mischel (1977) describes two categories of situations: powerful and weak. Powerful (or strong) situations are those in which demands placed on individuals induce conformity, whereas weak situations are those in which there are few situational pressures to conform (Mischel, 1977). In the context of training, a powerful situation is one in which there is considerable pressure to put forth effort or to become cognitively engaged. For example, a classroom presentation that requires active participation of members could be a powerful situation. A weak situation is one where there is less pressure to put forth effort and become cognitively engaged. Self-paced learning, in which an individual is expected to learn without direct supervision, is an example of a weak situation. Mischel (1977) predicts that individual differences exert the greatest influence in the weak situations and have the smallest effect in the powerful ones. Therefore, I predict that when the training treatment presents a weak situation, variation in individual differences will have more impact on outcomes than when there is a powerful situation.

In addition to these two general theories, instructional design theories from the educational psychology literature and models of training from the organizational behavior and human resource management literature address these concepts. These two literatures often examine similar constructs and

relationships, but don't necessarily draw from one another. A strength of my dissertation is the use of themes and research from organizational behavior, human resource management, industrial/organizational psychology, and educational psychology. If organizational training researchers ignore the wealth of information present in the educational psychology literature, important theories will be overlooked.

Learning and Learning Outcomes

Learning occurs in a learning event, which Gagne (1985) characterizes as having four elements. The first element is the learner, or in the case of organizational training, the trainee. The trainee's abilities, skills, attitudes, and personality characteristics are important aspects of the individual learner that must be considered. The second element, the stimulus situation, is a situation that stimulates the learner's senses. A training program and materials are categorized as stimulus situations. The third element is the information recovered from the learner's memory. Tapping into this memory can enhance learning effectiveness. The fourth element is the response, or in some cases, performance. A response is any action taken as a result of the stimulus situation inputs. A result is identified as performance if the effect of that action is considered.

Learning is the major dependent variable in my dissertation; specifically, I evaluate learning with measures of cognitive and affective outcomes. Kraiger et al. (1993) developed a theoretical taxonomy of learning outcomes in three

categories: cognitive, skill-based, and attitudinal. Cognitive learning outcomes account for declarative knowledge, procedural knowledge, and cognitive strategies. Skill-based learning outcomes refer to development of technical and motor skills. Affective learning outcomes involve a change in motivation or attitudes.

Cognitive learning outcomes are common in organizations and have been used in training research to assess learning (e.g., Colquitt & Simmering, 1998; Fisher & Ford, 1998; Phillips & Gully, 1997; Quinones, 1995). Cognitive outcomes are appropriate for examining skills such as verbal ability, and are often assessed using written tests (Kraiger et al., 1993).

I also investigate affective outcomes and time spent on training. These additional outcomes are relevant to investigations of web-based training because they are related to proposed strengths of web-based training. These outcomes are explained more fully in the description of web-based training.

The Learning Treatment: Learner Control

Situational factors of training, or more specifically, the treatments involved in training, may play important roles in learning outcomes. The strength of the training situation in my model is the level of learner control of training. Learner control is relevant to today's organizations because there is an emphasized need for individualized continuous learning (London & Bassman, 1989). Trainees often have different knowledge, skills, and abilities, which makes individualized learning experiences effective (Fleishman & Mumford, 1989). Additionally,

employees are often expected to keep their skills up to date through self-directed professional training and development activities (London & Bassman, (1989).

Learner control has been studied in the educational literature, specifically in terms of its role in computer-based training (CBT), or computer-assisted instruction (CAI). In studies of learner control, the results are not consistent. One area that has been overlooked in this area of research is the degree to which individual differences of learners interact with learner control to affect training outcomes. The role of individual differences will be discussed later.

Learner control has three components: pacing, sequence, and content (Milhelm & Martin, 1991). Pacing is the speed at which the training occurs. Learners often have varied levels of reading or comprehension speed, and learner-controlled pacing should accommodate these differences. If a learner can progress at a pace that is comfortable, he or she is likely to retain more of the learning content. Sequence is the order in which the trainee learns the material. Sequence can vary on a macro level, where larger training modules may be taken in any order, or it can vary on a micro level, where material presented within fixed modules may be presented in a non-structured sequence (Milhelm & Martin, 1991). If a learner is able to control the sequence of the material, he or she is more likely to maintain motivation by choosing the most interesting material to cover first. The final component of learner control in computer training is content. There is high learner control of content when the learner is able to choose which information he or she sees or reviews. This element of learner control contributes not only to the efficiency of the learning, but to the learner's

motivation (Milhelm & Martin, 1991). Individuals can ignore content that is already known and spend more time on content that is unfamiliar. Furthermore, if the learner does not have to spend time on familiar content, he or she is more likely to have a positive reaction to the training.

The levels of learner control of these three components can take several forms, varying by the degree to which the learner has control. Complete learner control affords the user all decisions regarding content, pacing, and sequence (Murphy & Davidson, 1991). In this situation, a learner could simply decide not to engage in any of the training. However, the goal is for the learner to engage in the training following his or her own strategy in order to maximize learning and efficiency. The inherent assumption with complete learner control, however, is that the learner is the most effective at formulating and executing that strategy (Murphy & Davidson, 1991).

Program control, or adaptive control, allows the user to continue with training material or a post-test only when the program has taken the learner through a certain amount of material or a set level of performance is achieved in practice (Murphy & Davidson, 1991). With these conditions, the learner is required to do at least the basics, and is unable to avoid necessary training. This contributes to creating a more uniform level of competency between learners, and may be most effective when there are minimum standards for proficiency.

Learner advisement retains the learner's control of content, pacing, and sequence, but informs the learner of topics that should be covered for mastery (Murphy & Davidson, 1991). At that point, the learner can ignore the advice or

follow it, based on his or her perceived need for training. Again, there is the implicit assumption that the learner is able to determine the necessary learning strategy and effectively follow it.

The research on learner control has produced mixed results (Kinzie, 1990; Milhelm & Martin, 1991; Steinberg, 1977). Some studies have found that increased learner control results in higher performance on post-tests (e.g., Avner, Moore, & Smith, 1980). However, others have found opposite results (e.g., Pollock & Sullivan, 1990). Additionally, many studies have found no differences in post-test scores due to amount of learner control (Lee & Lee, 1991; Murphy & Davidson, 1991; Pridemore & Klein, 1991). There are several possible reasons for discrepant results in this stream of literature.

Differences in the results of these studies may be due to the neglect of relevant individual differences of learners. Several studies included no measure of any person-specific factors, not even demographic characteristics (e.g., Avner et al., 1980; Murphy & Davidson, 1991; Pridemore & Klein, 1991). Other studies (e.g., Lee & Lee, 1991; Kinzie et al., 1988) measured learners' ability or prior knowledge, but did not assess any personality characteristics of learners. Another possible reason for different results is the small sample sizes generally used in these studies. The majority of these studies have sample sizes below 100. One notable exception is Avner et al., (1980) which had a sample size of approximately 700 participants. Finally, these studies were conducted on a variety of samples, ranging from junior high school students (e.g., Kinzie et al., 1988) to nursing students (e.g., Murphy & Davidson, 1991). These groups may

differ in their mean level or variance in relevant personality characteristics. Therefore, individual differences are important constructs to investigate in the context of learner control.

When there is high learner control, it is a weak situation: there are fewer pressures for the learner to behave in a certain way. In this situation, the learner may choose not to take certain modules of the training or engage in optional exercises or practice. A learner's individual differences are more likely to dictate his or her actions. Therefore, personality variables should be strong indicators of motivation to learn and learning outcomes. In high learner control treatments, there is more opportunity for learners' aptitudes to have an impact on learning outcomes. If individual learners possess the aptitudes necessary to learn, they are likely to have positive outcomes. However, if the necessary aptitudes are not present or prominent enough, the learning outcome will be less positive.

Low learner control is a strong situation because the learner is expected to conform to the pacing, sequence, and content presented in the program. In this situation, a learner may be required to engage in practice sessions or pass a post-test before finishing the training. To some extent, the treatment will compensate for individual differences in aptitude. Learners will process information similarly if it is presented in a very structured fashion.

In summary, aptitude theories prescribe looking at the interaction between aptitudes and treatments. One way to conceptualize different treatments is variation in the amount of learner control in a training situation. Previous studies

of learner control have all but ignored individual differences of learners. I next consider the relationships between individual differences in learning outcomes.

Individual Differences in Training

Although the learner has long been recognized as an integral part of the learning process, training research has only recently begun to utilize individual differences to explain learning outcomes. Recent studies support the relationship between individual's characteristics and learning beyond training design (e.g., Colquitt & Simmering, 1998; Fisher & Ford, 1998; Martocchio & Webster, 1992; Noe, 1986; Noe and Schmitt, 1986; Phillips & Gully, 1997; Quinones, 1995; Webster & Martocchio, 1995). Additionally, many instructional design theories account for individual differences, even though their emphasis is generally on manipulating attitudes rather than measuring more stable characteristics (e.g., Gagne, 1985; Gagne & Medsker, 1996; Keller, 1983).

Models of instructional design and organizational training provide information about individual differences that are likely to be related to learning. Keller (1983) described four conditions that would lead to increased motivation in learning. Interest, or curiosity, was the first. This is similar to Gagne's prescription for instruction to spark the attention of the learner (Gagne, 1985; Gagne & Medsker, 1996). The training situation must be constructed to maximize interest and interaction. However, individuals may have varying levels of innate curiosity also. The second condition in Keller's model is relevance, which is the extent to which a goal is related to the instruction. Therefore, the learner's goal is an

important consideration in the model. The third condition is expectancy, which is a subset of the motivation to learn construct. This will be described in more detail. Finally, satisfaction with the training may lead to higher motivation. Keller notes that satisfaction may stem from extrinsic rewards and intrinsic motivation.

An influential model in organizational training literature has been Noe's (1986) model of training effectiveness. Noe included motivational and environmental influences in his model, and predicted that motivation to learn would be an integral part of training effectiveness. Motivation to learn is "a specific desire of the trainee to learn the content of the training program" (Noe, 1986; p. 743). Motivation to learn is malleable and likely to vary depending on characteristics of both the situation and the individual.

Recent studies of learning have supported a significant, positive relationship between motivation to learn and learning outcomes. For example, Quinones (1995) in his study of pre-training effects on training outcomes, found that motivation to learn in a computerized decision-making task was significantly related to reactions to training, quality and quantity of decisions, and behavioral measures of training effectiveness. Another recent study, conducted by Colquitt and Simmering (1998), found that measures of motivation to learn at the midpoint of a six-week training course were significantly related to a measure of declarative knowledge at the end of training.

Baldwin, Magjuka, and Loher (1991) found that motivation at different points during training was related to a test of declarative knowledge. Motivation to learn the material was assessed before training began. After training, a similar

scale was used to assess the degree to which the trainee perceived himself or herself to have been motivated in training. Both measures had significant, positive relationships with trainees' ability to answer open-ended questions of knowledge of training materials.

The relationship between motivation to learn and learning outcomes has been supported in an open learning setting (Warr & Bunce, 1995). Open learning occurs when individual learners work on their own with a high level of autonomy and often involves multimedia applications (Warr & Bunce, 1995). A condition of high learner control can be characterized as open learning because learners are given some degree of autonomy over the content, pacing, and sequence of material. Warr and Bunce (1995) used a sample of junior managers to investigate the impact of trainee characteristics on learning outcomes in an open learning setting. They found that motivation to learn was significantly related to each learner's tutors' assessment of their performance in the training program. Additionally, Warr and Bunce recommend that motivation to learn should be measured at multiple time periods in training because motivation may change as exposure to the training content and method increase. Some limitations of this study include a subjective measure of learning and a small sample size. Therefore, further study using a larger sample and an objective measure of learning (declarative knowledge) is warranted.

Hypothesis 1: Motivation to learn will be positively related to learning.

Personality

Three motivational constructs that have been examined in the context of training motivation and learning outcomes are conscientiousness, openness to experience, and goal orientation. Conscientiousness and openness to experience are two of the "Big Five" personality factors (Costa & McCrae, 1992). Conscientiousness subsumes characteristics such as being hardworking, dependable, and organized. Highly conscientious people are more likely to finish things they have started and tend to be more responsible than individuals with low conscientiousness (Costa & McCrae, 1992).

A meta-analysis of the "Big Five" personality factors and organizational outcomes indicated that conscientiousness was the most robust predictor of job performance (Barrick & Mount, 1991). The estimated true correlation between conscientiousness and job performance criteria was determined to be P=.22 (Barrick & Mount, 1991). Although training outcomes and job performance differ, these results indicate the importance of conscientiousness to the work environment.

Conscientiousness can have an impact on learning as well as job performance. Learners who are conscientious are more likely to pay attention to details and to work through content in an orderly fashion. Colquitt and Simmering (1998) found that conscientiousness was significantly related to motivation to learn and cognitive outcomes in a longitudinal training study. Furthermore, they found that conscientious individuals persisted more in the face of initial failure in training. Although failure is not a part of every training situation, this finding points

to the tendency of conscientious individuals to overcome obstacles in training. Another study that supports the relationships among conscientiousness, motivation to learn, and learning was conducted by Gellatly (1996). In this study, conscientiousness was significantly related to expectancy, an element of motivation to learn. Furthermore, expectancy was significantly related to performance on an arithmetic task, which measured a cognitive learning outcome.

Hypothesis 2: Conscientiousness will be positively related to motivation to learn.

Hypothesis 3: Conscientiousness will be positively related to learning.

There is increasing evidence that the relationship between conscientiousness and behavior may be moderated by situational factors. For example, Barrick & Mount (1993) conceptualized the degree of autonomy in a job as representative of the strength of the situation. They found that when a situation was weak, conscientiousness was more predictive of job performance. This can be expected in a training situation as well. In a weak situation, a more conscientious person should perform better than a less conscientious person because of internalized perseverance and diligence.

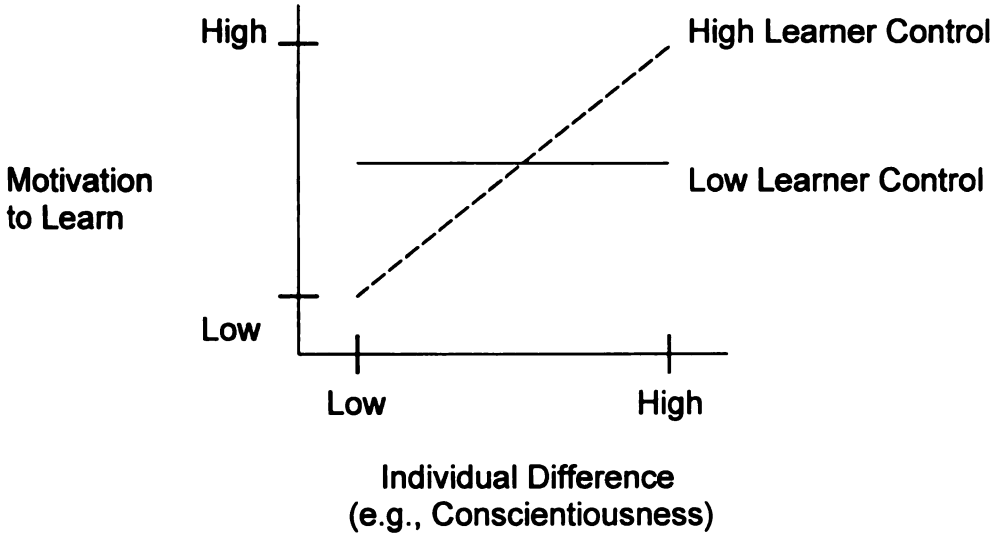
In my dissertation, the weak situation of high learner control should allow an individual's conscientiousness to play a greater role in learning. In a high learner control treatment, a learner's conscientiousness should have a much

greater impact. An individual who is more conscientious will be more likely to persevere, even when his or her interest in the training has diminished. Furthermore, these individuals are likely to be more engaged in the content, participating in optional activities even when they are not required. The conscientious individual's need to complete work will drive this behavior.

In the low learner control situation, the conscientiousness and motivation to learn will not be as strongly related. If learners are given few opportunities to affect their learning, then their characteristics won't be as influential in training. In the low learner control condition, the level of motivation to learn will likely be average (see Figure 2).

Figure 2

Expected Interaction between Individual Differences and Treatment



Hypothesis 4: Learner control will moderate the relationship between conscientiousness and motivation to learn such that when there is high control, conscientious learners will have higher motivation to learn than low conscientious learners. In the low learner control treatment, motivation to learn will be similar for all individuals.

Openness to experience is another Big Five personality characteristic (Costa & McCrae, 1992). An individual's level of openness is related to his or her intellectual curiosity, sensitivity, and broad-mindedness. An individual who is open is more likely to be interested in engaging in new tasks. Furthermore, openness may reduce feelings of apprehension often associated with new situations. Barrick and Mount (1991), in their meta-analysis of the "Big Five" personality traits, suggested that openness may be related to training proficiency because trainees who are more open are more likely to have positive attitudes towards learning experiences in general.

There has been little direct research involving the relationship between openness to experience and learning. Despite the lack of research in this area, studies using a construct similar to openness to experience are relevant. Specifically, research on cognitive playfulness provides information related to the effects of openness to experience. Cognitive playfulness is an individual difference that describes a person's tendency to interact spontaneously, inventively, and imaginatively with microcomputers (Webster & Martocchio,

1992). This definition is similar to the facets of intellectual curiosity and open-mindedness that are included in the construct of openness to experience.

Webster and Martocchio (1992) found that, in the context of a software training course, cognitive playfulness was positively related to learning and mood, an affective outcome. In this study, learning was measured using a declarative knowledge test and participants indicated their mood on a self-report measure. Webster & Martocchio (1995) also found support for the relationship between cognitive playfulness and positive training outcomes. Within a computer training setting, learners with high cognitive playfulness exhibited more focus and attention to the task and subsequently had higher scores on a performance measure of cognitive outcomes of training. Furthermore, learners high in cognitive playfulness tended to use the computer training software more frequently and had more positive attitudes towards the training.

Although cognitive playfulness is specifically referenced to microcomputers, a more general measure may provide insight into learning using media other than microcomputers. The central mechanism of cognitive playfulness is captured by the intellectual curiosity in the openness to experience construct. Therefore, these results should generalize to links between openness to experience and training outcomes.

Hypothesis 5: Openness to experience will be positively related to motivation to learn.

Hypothesis 6: Openness to experience will be positively related to learning.

In the different levels of learner control, openness to experience should play a large part in learners' motivation and interest. In a high learner control situation, an individual's openness to experience should dictate the degree to which he or she explores content and sequencing and optional elements of training, as openness involves intellectual curiosity (Costa & McCrae, 1992). Learners who are more curious and more tolerant of new situations should find training more motivating. In contrast, learners who experience low learner control have prescribed pacing, content, and sequence, and are less likely to differ in their learning in relation to their openness to experience.

Hypothesis 7: Learner control will moderate the relationship between openness to experience and motivation to learn such that when there is high control, highly open learners will have higher motivation to learn than learners with low openness. In the low learner control treatment, motivation to learn will be similar for all individuals.

As stated previously, in an aptitude theory, aptitudes and treatments will interact to affect outcomes. Snow (1978) notes that aptitudes related to information processing in different treatments can differ in reference to whether a person is goal-directed or not. In a training situation where there is no explicit

performance goal, learners' goal orientations will impact their behaviors. Keller (1983), in his instructional theory, emphasized the importance of relevance, or the extent to which a goal is related to instruction.

In training situations, learners often may choose different types of goals that can impact their subsequent actions (Button, Mathieu, & Zajac, 1996). Goal orientation consists of mastery orientation (or learning orientation) in which individuals are focused on gaining competence and of performance orientation in which individuals are focused on demonstrating competence. Individuals with mastery orientations are more likely to engage in difficult tasks in which they can learn even if there is a high chance of failure. Conversely, a performance orientation leads individuals to avoid difficult tasks so they will not risk looking bad in front of others.

Recent training research has supported the importance of goal orientation in understanding training outcomes. Fisher & Ford (1998) found that mastery orientation was significantly related to the mental workload that individuals perceived to have during training. In other words, the degree to which individuals felt that they spent their time on tasks and the amount of effort they gave was related to their emphasis on mastery goals. This study also indicated that performance orientation may detract from learning, as individuals with high performance orientations reported that they felt they exerted less on-task effort. Therefore, it is likely to expect that individuals with strong mastery orientations will be more engaged in the training and more likely to be motivated to learn and

that individuals with strong performance orientations will be less motivated to learn.

Two recent studies have investigated the specific effects of goal orientation on learning outcomes. Colquitt and Simmering (1998) found that mastery orientation was significantly related to motivation to learn in a training situation. Furthermore, performance orientation was negatively related to motivation to learn and learning. Phillips and Gully (1997) found that mastery orientation was positively related to self-efficacy, which was related to performance on a declarative knowledge test. Additionally, performance orientation was negatively related to self-efficacy. Therefore, this pattern of relationships, in which mastery orientation facilitates training outcomes and performance orientation detracts from them, should be found in similar investigations of learning.

In a training situation, individuals with mastery goals are less concerned with scoring well on tests, but are focused on learning the material (Button et al., 1996). Performance oriented individuals are more intent on demonstrating their competence by performing well on tests or completing training quickly, sometimes at the expense of not really learning the material. Therefore, I expect that individuals with mastery orientations will have a stronger motivation to learn and more positive learning outcomes than individuals with performance orientations.

Early research of goal orientation conceptualized the construct as a single dimension with performance orientation and learning orientation on opposite

ends of a continuum using studies of mostly schoolchildren (Dweck, 1986; Elliott & Dweck, 1988). However, recent research has conceptualized goal orientation differently than Dweck and her colleagues. Button, et al. (1996) presented factor-analytic evidence that goal orientation is best conceptualized as two independent dimensions rather than a unidimensional continuum. That is, individuals can be simultaneously high or low on both learning and performance orientations.

Button et al. (1996) also argued that individuals have dispositional goal orientations which predispose them to react to situations in specific ways, although situational cues can impact those predispositions (see also Dweck, 1975). Such situational cues could be the training treatment.

Linking these constructs to aptitude theory, Snow (1978) notes that individuals process information differently depending on how they approach goals and subgoals and their strategies for learning. The degree to which learners pay attention to material and concentrate in order to reach a goal may be influenced by the treatment. When a treatment allows learners more control, their goal orientation should have a stronger effect than when there is less learner control.

Hypothesis 8: Mastery orientation will be positively related to motivation to learn.

Hypothesis 9: Mastery orientation will be positively related to learning.

Hypothesis 10: Learner control will moderate the relationship between goal orientation and motivation to learn such that when there is high control, learners with a strong mastery orientation will have higher motivation to learn than those with a weak mastery orientation.

Hypothesis 11: Performance orientation will be negatively related to motivation to learn.

Hypothesis 12: Performance orientation will be negatively related to learning.

Hypothesis 13: Learner control will moderate the relationship between goal orientation and motivation to learn such that when there is high control, learners with a strong performance orientation will be less motivated to learn than those with a weak performance orientation.

Attitudes

Aptitude theory does not specifically address attitudes. However, they are an integral part of instructional design theories (e.g., Gagne, 1985; Gagne & Medsker, 1996; Keller, 1983). These theories commonly give prescriptions for training treatments that are intended to alter attitudes of learners. Therefore, they are important to consider in investigations of learning.

Legitimacy is one attitude that can be referenced to a training treatment. Legitimacy has been used in the organization theory literature to explain the degree to which organizational structures and functions are "taken for granted"

(Scott, 1991; Hannan & Carroll, 1992). Legitimacy is an integral part of both Institutional Theory and Population Ecology theory. Institutionalists contend that the more legitimate a practice, the more likely individuals will engage in it. For instance, the more common training is to an organization, the more likely individuals will find that it is legitimate and continue to be involved in it. According to the theory, legitimacy can stem from three sources: rules and regulations, norms, and individuals' cognitive structures.

Population ecologists use the term legitimacy in the same sense as institutionalists, but argue that legitimacy stems solely from density. The basic notion of Population Ecology is that density, which is simply the frequency of a practice, leads to legitimacy. Therefore, the more prevalent a practice, the more legitimate it becomes. In the context of organizational training, it can be inferred that the more prevalent training programs or specific attributes of those training programs are, the more likely individuals will view them as legitimate. For example, the prevalence of a particular training medium will lead to its increased legitimacy.

The legitimacy of a training experience should influence learning outcomes. A learner who believes the training method to be legitimate will be more likely to become engaged in it. Conversely, if a learner feels that the training is not a suitable way to learn the material, he or she will be less engaged.

Hypothesis 14: Perceptions of legitimacy will be positively related to motivation to learn.

Hypothesis 15: Perceptions of legitimacy will be positively related to learning.

Hypothesis 16: Learner control will moderate the relationship between perceptions of legitimacy and motivation to learn such that when there is high control, learners who believe the training is highly legitimate will have higher motivation to learn than learners with lower perceptions of legitimacy. In the low learner control treatment, motivation to learn will be similar for all individuals.

A New Training Medium: Web-Based Training

Aptitude-treatment interaction can be studied with any number of training media. However, in an investigation of learner control, one newly developed training medium that is especially relevant is web-based training (WBT). Web-based training, or web-based instruction (WBI) has become an increasingly popular topic of business periodicals (e.g., Cohen, 1997; Craiger & Weiss, 1997; Curtin, 1997; Filipczak, 1996; Pollack & Masters, 1997; Stevens, 1996; Wulf, 1996). Web-based training has been defined as "a hypermedia-based instructional program which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported" (Khan, 1997).

Two components that may be built into web-based training that are important within the context of learner control are hyperlinks and practice exercises. Hyperlinks are a unique component of web-based training that may

prove useful to learning. Hyperlinks are text or graphics that, when selected by a trainee with a mouse-click, move to another "page" within the training content. Hyperlinks can be linked to anything within a training program or to the World Wide Web for access to outside sources. This increased ability to find and gather information is a major benefit of WBT. Additionally, hyperlinks within a WBT program are often discretionary, so a trainee's motivation to learn may dictate the frequency of hyperlink use.

Practice has long been recognized as beneficial to learning within training (Gagne & Medsker, 1996). WBT allows for various types of interactive or non-interactive practice. Practice exercises can be created in the form of games in order to attract and maintain trainee attention. Alternately, they can be fashioned to simulate actual job tasks to create training fidelity and foster transfer of training. Regardless of how it is designed, practice is an important component of WBT.

Web-based training is also an interesting medium to use because of technological advances in organizations. The importance of technology in human resource management systems and training, in particular, has been emphasized recently (e.g., Goldstein & Gilliam, 1990; Howard, 1995; Turnage, 1990). The potential usefulness of web-based training for instruction can be evaluated by examining the ways in which media are chosen for instruction. If WBT is matched to the characteristics of instruction, it is more likely to be effective. In choosing media for instruction, three factors are important to consider: (1) the physical

attributes of the medium, (2) learner, setting, and task characteristics, and (3) practical factors such as cost (Reiser & Gagne, 1983).

The physical attributes of the medium are its capabilities to provide text, pictures, sound, or motion (Reiser & Gagne, 1983). Web-based training has many of these capabilities, and a benefit of WBT is that they can be used simultaneously. Learner characteristics may refer to learner abilities, such as reading abilities or other skill levels. These abilities can be construed to be the same as the aptitudes. Because WBT has many physical attributes available, it can be modified to meet different learner characteristics. The amount of learner control or level of readability is easily changed (Khan, 1997). Setting characteristics can refer to the physical location of training or in what type of setting (e.g., group, individual, etc.) training occurs. Web-based training may be used anywhere a computer is linked to a program, and may be used in pairs or small groups, although often WBT is fashioned for individual use. Task characteristics are the elements of the tasks that can only be supported by certain media. For example, in order to understand a spoken foreign language, you must have an audio component to the training medium. Many different task characteristics can be supported by WBT, excluding situations in which the learner must work in direct physical contact with a trainer or actual equipment must be used (Khan, 1997). These exceptions are few, however—even simulations can be presented via video in WBT. Therefore, many types of tasks can be taught using WBT.

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The final factors to consider in choosing instructional media are practical factors such as cost, time, and availability of trainers or equipment. Reiser and Gagne (1983) caution that practical factors should not be the primary concern when selecting media, but should be considered only after the other criteria for media have been met, therefore maximizing instructional value. Cost is a main concern for WBT because of the use of microcomputers, which are a relatively expensive instructional medium. However, with the flexibility of time and location for use of WBT, several learners can share computers. Furthermore, most organizations today have computers and related equipment that are capable of handling WBT programs. Beyond the equipment, another cost of WBT is in developing the training programs. Few organizations have the internal expertise to create effective WBT programs, so consultants are often used. Although both of these are major concerns for WBT, the cost of these in the long run is diminished, especially when compared to costs of other non-web computer-based training (Craiger & Weiss, 1997; Khan, 1997). For example, if a CD-ROM is used for a training program, and changes to content will involve a change to the program and reissue of the CD-ROM, it can be very costly, especially if there are many learners. Web-based training content, however, is generated from a single source (the Internet or a company intranet), and changes to the content are immediate and comprehensive (Filipczak, 1996). All users will see changes without needing extra or different equipment.

Web-based training enjoys advantages over other types of more commonly used media when these three factors are considered. Table 1

compares the factors identified by Reiser & Gagne (1983) of two other common types of training media. WBT offers advantages of increased flexibility and capabilities.

Web-based training has disadvantages in relation to other instructional media. Because the program must be run off of the World Wide Web or a company's intranet, the capabilities for video and audio richness are not as extensive as for CD-ROM based programs. Additionally, intranets may be susceptible to theft, and security measures must be built into the program to protect information (Canterucci, 1997). This may increase costs of development and maintenance. Also, web-based programs are often designed for a specific type of web browser and are limited to the capabilities of certain personal computers (Curtin, 1997). This can result in programs being built for the "lowest common denominator" of equipment that may preclude more advanced features.

Table 1

Comparison of Common Training Media

Medium/ Characteristic	**Instructor**	**Printed Text**	**Web-based Training**
Physical Attributes	Limited to oral language and demonstration	Limited to written language and pictures	Can include audio, video, and interactive components
(a) Learner	(a) Can individualize material in small groups, but not in larger ones	(a) Can individualize learning strategy only	(a) Can individualize material if built in
(b) Setting	(b) Limited to where instructor can physically be	(b) Can use in any setting	(b) Limited to where computer can physically be
(c) Task characteristics	(c) Suitable for tasks that can be taught orally or demonstrated	(c) Suitable for tasks that can be learned by reading only	(c) Suitable for tasks that can be taught verbally, with text, with pictures, with simulation, or with video
Practical factors	Cost of trainer ranges from high to low; can be difficult to find qualified instructors	Low cost unless materials need to be updated frequently	High initial cost, but low cost to maintain and update

Note. Based on Reiser & Gagne (1983).

Additional Outcomes

One of the benefits that proponents of web-based training have identified is that it can be a more efficient means of training. In other words, learners are expected to spend less time in training. Although I don't compare the efficiency of WBT to other training media, I will examine the differences in efficiency between two levels of learner control. In general, I expect that when the learner has high control, he or she will spend less time on training. It is a fundamental assumption of learner control research that learners know what is most effective and efficient for them.

Hypothesis 17: Learners in the high learner control condition will spend less time on training overall than learners in the low learner control condition.

Kraiger, et al (1993) identify affective based learning outcomes as one of three important training outcomes. This includes issues such as attitudes, motivation, and goals that are relevant to the objective of the training program. These learner attitudes can determine behavior or performance, and are therefore important indicators of training effectiveness (Gagne, 1984; Kraiger et al., 1993).

For any training course, an affective outcome of interest may be the learner's level of desire to participate in another similar training program. In the

case of WBT, this may be especially important, because the investment in a WBT program is expected to pay off over time. Unlike a lecture, which may have a single administration and a one-time cost, WBT is expensive to start but becomes more cost-effective the more that it is used. If learners find WBT to be something to which they have an unfavorable reaction, their disinterest in pursuing further WBT can make the program a losing investment for an organization. Furthermore, dissatisfied learners may communicate negative reactions to training to other learners and influence their views.

The amount of learner control should have a direct effect on the level of satisfaction with training. In general, individuals who are allowed to control the content, pacing, and sequence of the training should feel trusted and empowered. Therefore, they will likely be satisfied and perhaps more inclined to participate in future web-based training.

Hypothesis 18: Individuals in the high learner control treatment will have more positive affective outcomes than individuals in the low learner control treatment.

Transfer of training is the degree to which trainees effectively apply the knowledge, skills, and attitudes gained in a training context to the job context (Ford & Kraiger, 1995). One expected outcome of transfer of training is whether or not the skills and behaviors learned in training generalize to situations in a job context that are similar to, but not the same as, the training (Baldwin & Ford,

1988). Baldwin & Ford (1988) proposed a model of transfer of training, in which trainee characteristics, training design, and the work environment were related to learning and retention. Transfer of training (generalization and maintenance of trained skills and behaviors) was modeled to be influenced by trainee characteristics, the work environment, and the learning and retention in training. Learning is necessary for transfer of training to occur, but it is not sufficient to ensure transfer.

In this dissertation, I am interested in the link between learning in training and transfer of training. Transfer of training is always a concern when studying the effectiveness of training, and although it is not my main research question, I will address it. Additionally, transfer of training is affected by a number of different factors (e.g., work environment, training design), but the context of my study does not allow for investigation of these. Therefore, I will only test the significance of the relationship between learning and transfer of training and not focus on additional antecedents of transfer of training.

Hypothesis 19: Learning will be positively related to transfer of training.

Other Factors

In the context of web-based training, some individual characteristics may covary with training outcomes. In particular, computer experience, computer anxiety, gender, primary language, and cognitive ability of learners may be important factors to consider. These variables are discussed in more detail.

Computer anxiety, or "computerphobia," consists of negative feelings towards computers that affect one's ability to use and understand them (Murrell & Sprinkle, 1993; Ray & Minch, 1990). These feelings are likely to be related to learning outcomes in web-based training (Cornell & Martin, 1997). Learners who feel anxious about situations tend to lose focus on the task and instead focus on worry (Wine, 1977). Furthermore, computer anxiety has been found to be related to declarative knowledge gained in a computer training program (Martocchio, 1994). Therefore, in a WBT context, computer anxiety should be a covariate of outcomes.

Computer experience should be negatively related to computer anxiety. Computer experience, which can be conceptualized as the amount of time individuals spend with computers and their degree of comfort with computers, is likely to decrease feelings of anxiety.

There has been little research regarding the degree to which gender is related to performance on computer-related tasks. One study of gender differences in computer-related attitudes found that first-year college students had no significant differences in computer experience, but did have differing attitudes; specifically, males felt more comfortable using computers and rated their skill levels as higher (Wilder, Mackie, & Cooper, 1985). Although this study would support a prediction for significant gender differences in computer-related attitudes, there are several reasons why this may not be the case. First, explanations for differences between the males and females of the sample were not fully explored. A measure of generalized self-efficacy may have revealed

differences that carried over to computer-related attitudes. Second, the data for this study was collected nearly fifteen years ago. It is likely that with the increased use of computers in workplaces and schools that the level of comfort with them may have increased for females, particularly since many traditionally female-dominated jobs, such as secretarial positions now frequently use computers.

Current research involving computer training has revealed no significant differences between males and females in computer experience and training outcomes (e.g., Martocchio, 1994; Webster & Martocchio, 1995). However, most studies of learner control in computer training have not included assessments of the relationship between gender and training outcomes (e.g., Lee & Lee, 1991; Murphy & Davidson, 1991; Pridemore & Klein, 1991). Therefore, I will investigate gender as a possible covariate of training outcomes.

Most WBT programs require some level of reading ability, especially when the objective of training is to increase learning in the area of cognitive outcomes such as declarative knowledge. Therefore, a learner's primary language is likely to be a covariate of performance in a WBT program that has a reading element. I will assess learners' primary language as a control variable.

Performance in training, and specifically when cognitive outcomes are assessed, can be a function of cognitive ability. Therefore, I will collect two measures of cognitive ability as control variables in this study.

METHOD

Participants

One hundred eighty-nine subjects participated in this study. Participants were undergraduate college students recruited from two classes: an upper-level human resource management course and an upper-level communications course. The university has categorized both courses as Tier II writing courses, which means that there must be a significant focus on writing in the assignments. The grammar skills of these students tend to be low. Therefore, a task in which students learn grammar may contribute to performance in the class, but does not guarantee it.

Upper-level undergraduate student samples have been used in recent studies of individual differences in learning, including Colquitt & Simmering (1998) and Phillips & Gully (1997). In my dissertation, a student sample is appropriate for two reasons. First, the training material is related to class performance, and therefore, the participants have a vested interest in engaging in the task. Second, the ability for strict control of treatments improves the internal validity of the research (Cook & Campbell, 1979).

The trainees had incentive to perform in this situation because of possible rewards in addition to course credit. First, the content of training was directly related to class assignments. Second, the grammar skills that participants learned could be used in assignments for other classes. Finally, I offered three

$20 gift certificates to a local store to be randomly awarded to three study participants.

Eighty-four percent of the participants were enrolled in the human resources management class, and 16% were enrolled in the communications class. The study participants were 66% female; 44% were business majors, 20% were dietetics majors, 15% were communications majors, 7% were interdisciplinary social studies majors, 7% were majoring in other areas of management (e.g., food industry management), and the remaining 15% had other majors (primarily liberal arts). Participants' ages were estimated to be, on average, in the early 20s, as is typical for the course.

One concern with using two separate classes is differences between the two that may be related to variables of interest in the study. I conducted t-tests to determine any significant differences between the participants in the two classes. The classes differed significantly on three variables: learner control ($t=2.41$, $df=40.90$, $p<.05$), major ($t=6.49$, $df=63.02$, $p<.05$), and time spent in training ($t=2.22$, $df=60.96$, $p<.05$). Because of these significant differences, I created a dummy variable to account for which class each participant was enrolled in and entered that variable as a control in some analyses. I also created a variable to account for any interaction between class and learner control. I used this control variable in some analyses.

Power Analysis

A power analysis is an indication of the degree to which the sample size of a study is large enough to determine significance of effects. Cohen (1992) categorizes effect sizes for multiple regression as follows: small = .02, medium = .15, and large = .35. In my sample, one hundred eighty-nine people provided useful data for the study. With a sample size of 189 and a significance level of $p<.05$, I will be able to find medium effect sizes for multiple regression using up to 8 independent variables.

Web-Based Training

The web-based training in this study taught basic grammar related to business writing (see Appendix A). In order to design WBT and offer content appropriate to the needs of the participants, I consulted writing assignments from previous students of the human resource management course. Using these and other references, I wrote the web-based training to target the most frequent and basic errors in student writing.

The WBT was divided into three modules: possessives and contractions, sentence structure, and word choice. Within each module were two to three topics. Each module included a description of the grammar rules and examples of correct and incorrect grammar usage. Each module also included three optional interactive practice exercises and one hyperlink labeled "click here for a helpful hint." Therefore, learners could access a total of nine practice exercises and three hyperlinks.

The web-based training was available on a computer server to which all participants had access from either their homes or from university computer laboratories. Participants were required to have the uniform resource locator (URL) for the site in order to gain access to it. The participants were asked to provide their student identification number and class section number, which allowed for verification that participants were a part of the relevant participant pool.

Procedure

The time line for this study is presented in Figure 3. In the human resource management course, the web-based training was available to the participants at any time on any computer connected to the World Wide Web for three weeks before the first writing assignment was due. The class instructor emphasized the usefulness of the web-based training for this assignment, which was an individual research paper.

The communications course did not require an individual writing assignment similar to that in the human resource management class. Therefore, the measure of transfer of training (the writing assignment) was not available for some of the participants. The instructors for these classes also emphasized the usefulness of the web-based training for writing assignments. Participants in the communications course had access to the web-based training for a period of approximately one month.

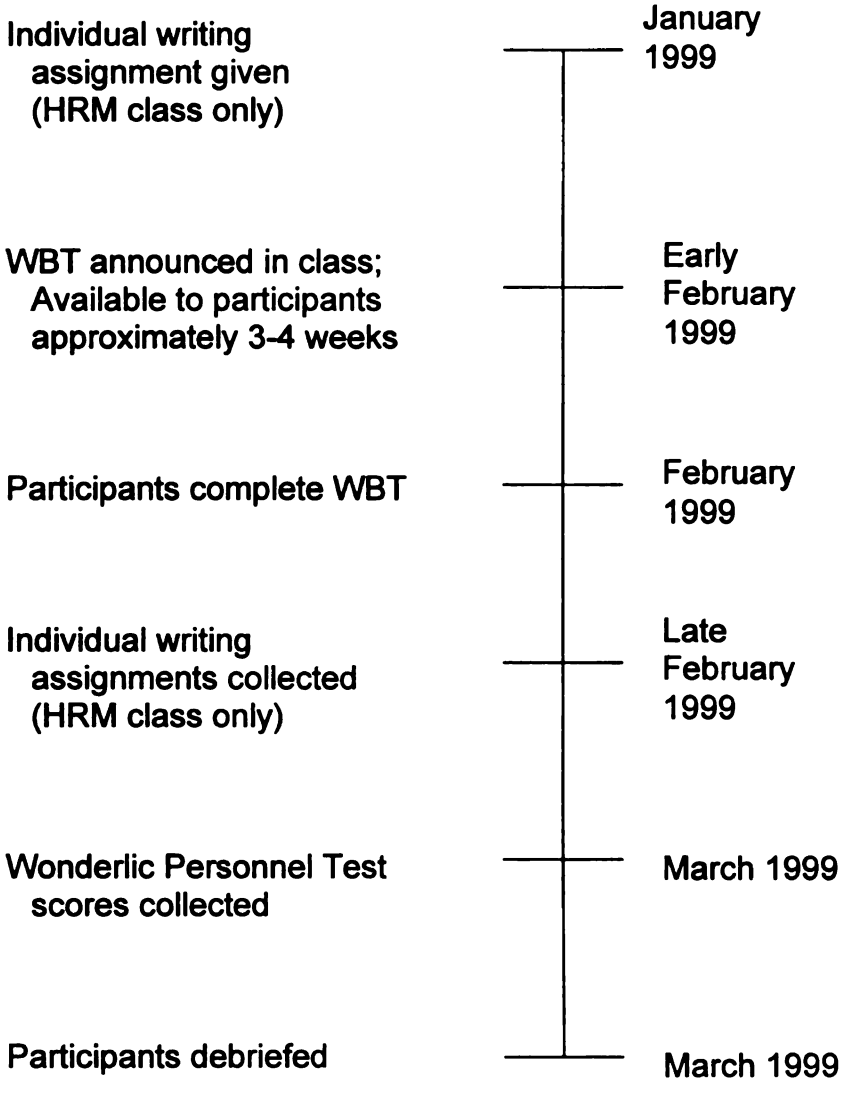
Participants in both courses were allowed to access the web-based training as often as they liked, since there was an option to view the training without participating in this dissertation research. However, participants were not allowed to take part in the study more than once or if they had previously viewed the web-based training.

The structure of the web-based training is pictured in Figure 4. The web-based training was designed to be approximately 1-2 hours of instruction in grammar. The length of the training session varied due to the speed at which individual learners progressed through the training and whether or not they completed the optional practice exercises and accessed optional hyperlinks.

The study was conducted under one of two conditions: high learner control and low learner control. In the high learner control condition, the trainees were given the opportunity to review the three training modules in any order and the topics within the modules in any order. Participants were informed that all practice exercises were optional, but that they should do at least one. In the low learner control condition, the trainees were required to progress through the modules in a structured sequence. Participants in the low learner control condition were told that all practice exercises were optional, but that they should try to do all of them. In both conditions, the three hyperlinks were optional. This afforded some learner control, but considerably less control in the second experimental condition than the first.

Figure 3

Study Time Line



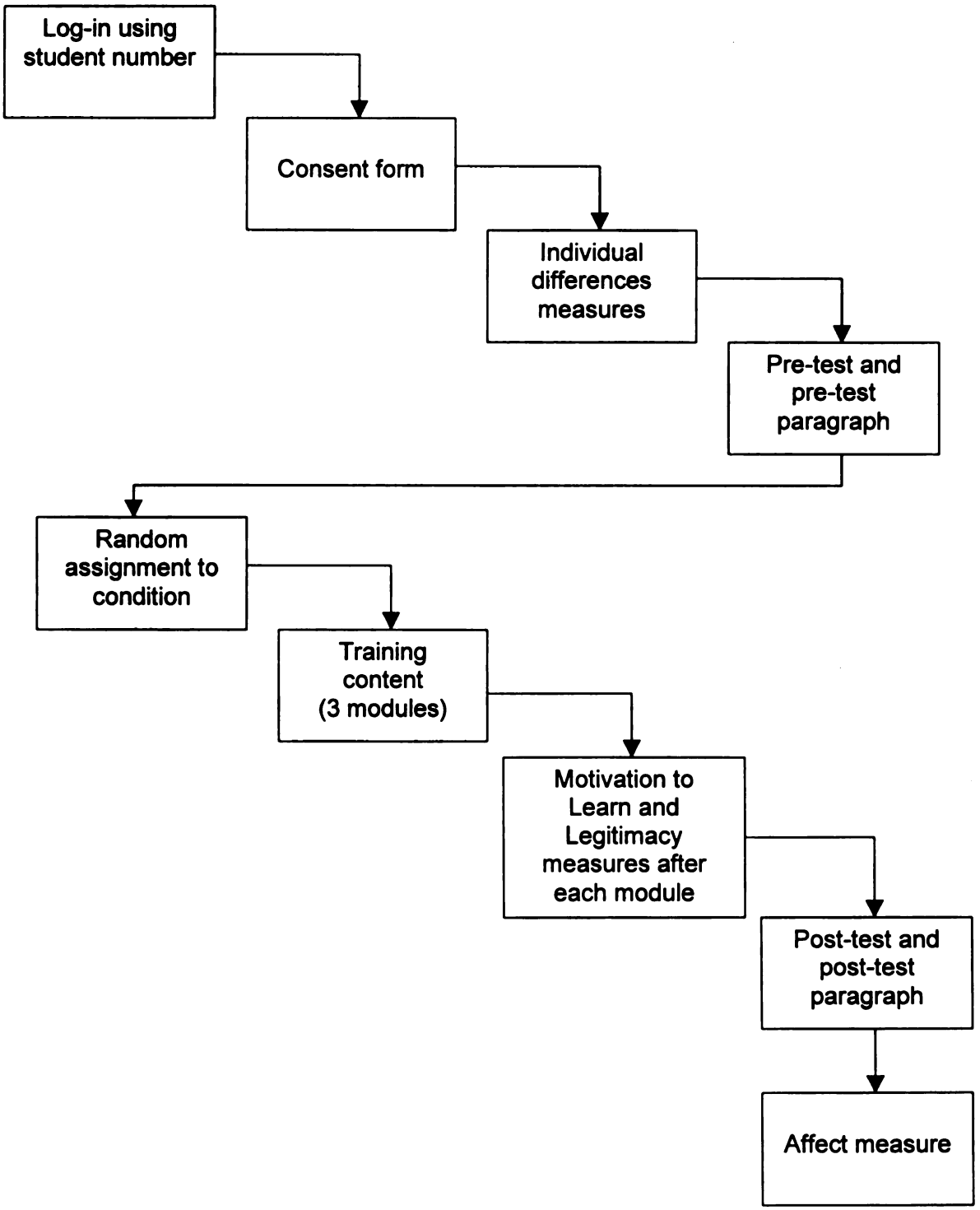
In both conditions, participants were informed that they must complete all modules. In order to ensure that trainees in the high learner control condition reviewed all modules before moving to the post-test, the web-based training was designed to hide the hyperlink to the post-test until the program verified that all three modules had been accessed. This prevented any problems resulting from a confound between the amount of content reviewed and the learner control treatment.

Participants logged onto the training program by entering their university assigned student number and section number. They were then asked to print out the consent form, sign it, and return it to the researcher after they completed the training. The consent form is shown in Appendix B. The training began with information about the study and offered participants the option of continuing the study or only viewing the lesson without participating in the study. For those who decided to participate in the study, directions were given.

Participants were asked to complete several individual differences measures within the WBT before moving on to training content. Participants completed conscientiousness, openness to experience, goal orientation, computer anxiety, and other (e.g., demographic) measures using radio buttons (see Appendix C). After completing the individual differences and demographic measures, the trainees completed a 30-item dichotomous choice pre-test to measure grammar ability. They were then asked to read a paragraph with grammatical errors and indicate the number of errors. Participants were given no indication of their performance on this pre-test. Both tests are in Appendix D.

Figure 4

Web-Based Training Structure



Trainees were then randomly assigned (by the program) to the learner control conditions and given directions to continue with the web-based training. Trainees were not informed as to which condition they were assigned. Within the web-based training itself, the trainees in the high learner control condition were given a choice of sequence of the three modules and the sequence of the topics within those modules. Trainees could not continue on to the post-test until they had completed all modules. In the low learner control program, the modules were offered in the same order, and no choice of sequence was given. The trainees then progressed through the program. During the training, at the end of each module, trainees' motivation to learn and perceptions of legitimacy of learning grammar and of web-based training were measured.

At the completion of all three modules, trainees were given a 30-item dichotomous choice post-test and a paragraph to read. Both the post-test and post-test paragraph were identical to the pre-test and pre-test paragraph. After submitting their post-test scores, but before logging off the training program, the trainees answered seven affective outcome items. Finally, the trainees were thanked for their participation and given the researcher's e-mail address in order to accommodate any further questions.

After the final date of the availability of the web-based training, I administered a short test of cognitive ability to the participants in separate classroom periods. I also collected scores from teaching assistants that indicated the frequency of grammar errors on in writing assignments for each participant who was enrolled in the human resource management course. The participants

in the communications course were not required to complete a similar writing assignment to that in the other course, so no scores for this outcome were collected from that group of participants.

After the participants completed the training, I informed them of the purpose of the study and the two learning conditions in a separate classroom presentation. Preliminary aggregate results were presented to the participants in the debriefing session and the three gift certificates were awarded. At that time, participants were able to ask questions about the study.

Pilot Testing

In the fall semester of the human resource management class, I conducted pilot testing of the web-based training. This pilot test was used in this dissertation in order to verify the reliability and validity of several of the measures. In instances in which new measures were used, I examined the psychometrics of the scales using the pilot data. However, all information reported in the Measures section is based only on the psychometric evaluation of the measures based on data collected during the actual study.

Measures

These measures, excluding the Wonderlic Personnel Test, the transfer of training measure, and the pre-test and post-test are shown in Appendix C. The pre-test and post-test are in Appendix D.

I used two types of measures in this study: those that have demonstrated reliability and validity and those that were newly developed for this study or that lacked consensus regarding the number of items. As a result, factor analysis was used to assess the dimensionality of these constructs. In these analyses, I used Principal Axis factor analysis with a varimax rotation. If there were cross-loadings of items on factors, I evaluated this in two ways. First, I accepted the factor loading only if it was larger than ±.30. Second, I would only accept a factor loading if it was ±.10 larger than the loading of that item on another factor (Dillon & Goldstein, 1984).

Independent Variables

Conscientiousness. Conscientiousness was measured using Costa & McCrae's (1992) short form scale (12 items) from the NEO-PI instrument. The reported test-retest reliability of this scale is .83. In this sample, the coefficient alpha reliability was .75.

Openness to Experience. Costa & McCrae's (1992) short form NEO-PI scale of Openness to Experience was used. The test-retest reliability for this 12-item scale is reported as .80. I performed a factor analysis to determine the discriminant validity of the conscientiousness and openness to experience scales. Using principal axis factoring and a varimax rotation, I found that the 12 conscientiousness items and one openness item loaded onto the first factor. The remaining 11 openness items loaded onto the second factor. Item 5, which is "Poetry has little or no effect on me," did not conform to the rest of the scale, and

therefore it was dropped. The revised scale, with 11 items, had a coefficient alpha reliability of .70.

Goal Orientation. The eight-item scale from Button et al. (1996) was used to assess mastery orientation. Coefficient alpha reliability with this sample was .76. The eight-item scale from Button et al. (1996) was used to assess performance orientation. Coefficient alpha reliability with this sample was .78. Although mastery and performance orientation were previously conceptualized as ends of a continuum, recent evidence supports the notion that they are two separate scales (Button et al., 1996). A factor analysis indicates that the items from these scales load onto discrete factors.

Legitimacy. The legitimacy of training was measured with six items. The items were written to measure the perceptions of legitimacy of two things: learning grammar at this point in the participants' education (at the college undergraduate level) and the use of web-based training. I measured legitimacy at three time periods, once after each module of the web-based training was completed. I felt that because this was a malleable attitude, participants' perceptions may have changed as they progressed through the WBT.

This was a new scale specifically written for this dissertation, and I performed an exploratory factor analysis on the items (at all three time periods) to determine the dimensionality of the scale. Using Principal Axis factor analysis and a varimax rotation, I found three factors. Items 3, 4, and 6 loaded into factor one with 49.33% variance explained. This item represents the legitimacy of web-based training. Items 1 and 5 loaded into factor two with 25.76% of the variance

explained, which represents the legitimacy of learning grammar. Item 2 loaded into a third factor. This item is a measure of the legitimacy of using web-based training for learning grammar. Because this is a one-item measure, I decided not to use it in further analyses. In analyzing the hypotheses, I used only factors one and two, which I named "legitimacy of web-based training" and "legitimacy of grammar," respectively.

I measured legitimacy at three time periods, once after each module of the WBT was completed in order to capture any changes in this attitude throughout training. Unfortunately, administration of this measure at three time periods may have contributed to participants' fatigue, as there was considerable missing data from the time 3 measure. The number of participants who completed the time 3 measure was 83, which was 44% of the sample.

I performed a t-test between the group that completed the time 3 measure and the group that did not. The t-test revealed that the random assignment to learner control was related to the completion of the time 3 measure. The correlation ($r=.87$, significant at $p<.01$) between those who had missing data and the learner control condition indicates that individuals in the high learner control condition were more likely to skip the time 3 measure. Perhaps these participants, in being able to see the amount of material left necessary to complete the training, were more impatient, and therefore skipped answering these questions. Another variable that was related to the completion of the time 3 measure was the number of practice exercises completed. These two variables are positively correlated ($r=.56$, significant at $p<.01$), which means that

participants who completed practice exercises were also more likely to complete the time 3 measures.

This missing data is problematic, as there are differences between the groups of participants who completed the time 3 measure and those who did not. The correlations among the three administrations of each of the legitimacy scales are above .79, and therefore, I chose to use only the time 1 data from each. This scale has the least missing data, and therefore will result in the best statistical power for analyses.

Computer Anxiety. A computer anxiety scale was adapted from Howell, Mullins, Fisher, Schmitt, and Kozlowski (1998). The full scale includes 17 items that assess both computer anxiety and Internet anxiety. I chose nine questions from the scale that I believed were relevant to measuring computer anxiety. The items related to Internet anxiety were, in general, a measure of a person's anxiety for finding information on the Internet. Because my study (and WBT) is concerned with use of computers in general, and not finding information on the Internet, I did not use those eight items.

This measure is relatively new, so I conducted a factor analysis to determine its factor structure. Using Principal Axis factor analysis and a varimax rotation, I found that the nine items loaded into one factor. The coefficient alpha for this scale was .88.

Computer Experience. Participants were asked to estimate the number of hours they spent per week using (1) computers in general and (2) the World Wide Web (WWW) for any reason. Additionally, participants were asked to

indicate whether or not they had ever taken web-based training. Finally, participants were asked to indicate their perceptions of their own skills using (1) computers in general and (2) Internet browsers (such as Netscape or Internet Explorer).

Gender. Gender was collected as a self-report item. Males were coded as zero, and females were coded as one.

Primary Language. Participants were asked to indicate the language that they considered their primary (native) language. Participants were able to indicate a secondary language to account for bilinguality. English was coded as zero; others were coded as one to represent English as a second language.

Major. Participants were asked to indicate their major area of study. Because the web-based training emphasized business style writing and referenced business situations in examples, whether or not a participant is a business major could be a covariate. Major was coded as 1 for business majors and as 0 for non-business majors.

Cognitive Ability. Participants completed the Wonderlic Personnel Test, a 50-item, 12-minute test in a separate classroom session. This measure is frequently used in employment testing to assess cognitive ability.

Academic Achievement. Participants reported their approximate college grade point average.

Dependent Variables

Motivation to Learn. There are several approaches to measuring motivation to learn. One method is to use questions that directly assess a person's motivation to learn. I adapted four items from Noe & Schmitt (1986) to directly measure these attitudes. While this measure is straightforward and provides high face validity, it is fairly transparent, and therefore, susceptible to social desirability bias (Mathieu & Martineau, 1997).

A second method for assessing motivation to learn is based on Expectancy Theory (Vroom, 1964). This method employs three scales: valence, instrumentality, and expectancy, which are either used separately or multiplied to form a composite measure (Mathieu & Martineau, 1997). For these scales, I adapted items from Lawler & Suttle (1973) to assess valence (7 items), instrumentality (3 items), and expectancy (2 items). The expectancy approach is less transparent and allows for more in-depth investigation, as the three scales account for each element of motivation (Mathieu & Martineau, 1997). Because of their level of detail and transparency, I expect that since the direct motivation to learn measure and the VIE composite measure will be positively correlated, they can provide unique information.

I factor analyzed the direct motivation to learn measures and found that the four items loaded onto one factor. I also factor analyzed the valence, instrumentality, and expectancy scales. Instrumentality and expectancy each loaded onto separate scales. However, valence fell into two factors. Items 3-7 loaded onto factor one (56.09% variance explained), and items 1 and 2 loaded

onto factor two (19.40% variance explained). Upon examination of these items, I determined that items 1 and 2 were different from the others in that they assessed the valence of classroom performance and not performing well in training. The instrumentality and expectancy items only referenced training performance, so assessing the valence of classroom performance was not relevant. Therefore, I dropped items 1 and 2, making the revised scale five items.

In order to calculate a composite VIE measure, I multiplied the score for the revised valence scale, the instrumentality scale, and the expectancy scale. This multiplicative approach follows Vroom's (1964) conceptualization of motivation, and has been used in previous motivation to learn research (e.g., Mathieu, Tannenbaum, & Salas, 1992).

I measured motivation to learn and VIE at three time periods in order to capture any changes in motivation over the course of training. However, these measures were administered with the legitimacy measures, and I encountered the same missing data problem as with that scale. The correlations among each of the scales at the three time periods ranged from .69 to .85.

Therefore, I used only the time 1 measure to avoid problems associated with missing data in the second and third administrations of the measure.

Pre-test/Post-test. The pre-test and post-test were the same 30-item dichotomous choice test (see Appendix D). It included 10 questions from each module of training, and participants were asked to indicate whether or not the use of a word in a sentence or a complete sentence was correct or incorrect. Pilot testing indicated that this format increased the variance of scores over a

format in which participants were asked to choose the correct word to put in a blank in a sentence. The dichotomous 30-item post-test was scored by adding together the number of correct answers out of 30. The pre-test was administered before training began, but participants were given no indication of their score.

The mean difference between the pre-test and post-test (using all 30 items) was 2.13. This difference was surprisingly low, and was possibly caused by ceiling effects (i.e., high scores on the pre-test). In order to understand the small difference between the pre-test and post-test, I created another pre-test and post-test score, one that eliminated items in which 90% or more of the participants answered correctly. However, after removing these items, the mean difference between the pre-test and post-test did not increase. Therefore, I reverted to the original score, which used all 30 items.

There are several ways to statistically determine the degree to which participants in an experiment have learned. Arvey and Cole (1989) discuss four methods for determining whether or not a training intervention is statistically significant. Two of these, gain-score design and analysis of covariance, are relevant to my study. The gain-score design makes use of difference scores, specifically, the difference between each individual's pretest and posttest score (Arvey and Cole, 1989). However, this method is based on the assumption that the pretest and posttest scores are perfectly correlated. The pre-test and post-test scores are correlated .42 (significant at $p<.05$) and the pre-test paragraph and post-test paragraph are correlated .71 (significant at $p<.10$). Because these scores are not perfectly correlated, the gain-score approach is not the best

method. In contrast, the analysis of covariance approach uses the pretest score as a covariate when predicting the posttest score, therefore accounting for the actual correlation between the two tests. This analysis of covariance is equivalent to multiple regression procedures in which the pretest is used as a control.

Pre-test Paragraph/Post-test paragraph. I used a second measure for a cognitive outcome that required participants to identify the number of errors in a paragraph. This paragraph was written to read like a typical business memo. It included common errors in possessives and contractions, sentence structure, and word choice. The participants were asked to read the paragraph on the screen and then indicate, in text boxes, the number of each type of error (e.g., number of apostrophes incorrectly used). The scores for the pre-test paragraph and post-test paragraph were derived by computing the absolute value of the difference of each answer from the correct answer. These absolute values were then added together for all questions. Therefore, a higher score indicates that either the participant did not identify enough errors in the paragraph or identified correct grammar as faulty, or both.

Affective Outcomes. Affective outcomes such as satisfaction with training and willingness to participate in future WBT were assessed with eight items. The coefficient alpha for this scale was .93.

Training Time. The amount of time each participant spent with the training program was monitored via the computer. The web-based training recorded the time that the participant first began. The computer also noted the time that the trainee spent on each module and the time that the trainee ended

the program. One concern with a measure of training time is that participants may spend time during training doing other activities such as talking with others, using the restroom, or doing other work. This was not accounted for in the training time data. However, in the program directions, participants were asked to complete the training in one sitting.

Transfer of Training. Participants were required to complete an individual paper assignment for the human resource management course (see Appendix E for the assignment). The use of grammar in this paper is a measure of the transfer of training. I reviewed each paper and counted the number of grammar errors made. I did not count any errors related to content that were not taught in the web-based training (e.g., misuse of commas). A high score on this measure indicates poorer performance.

Because the length of these papers varied by participant, I also estimated the number of words used in each paper. I counted the words used on one full page of each participant's paper and then multiplied this by the number of pages (and partial pages) written. Participants who write more words have more of an opportunity for grammatical errors. Therefore, by estimating the length of each paper, this allows for a more fair comparison among participants.

In analyses, I did not create a ratio variable of number of errors divided by number of words. Instead, I controlled for the length of the paper. Using a ratio variable reduces the ability to explain relationships. For instance, if the post-test score is positively related to the ratio of errors to length, this could mean that the post-test score is capturing variance in the length of the paper and not the

number of errors. This is likely, since length of paper and post-test score may be spuriously correlated. Therefore, in the analysis of transfer of training, I controlled for the length of each paper.

Use of Practice Exercises. Nine practice exercises (three within each module) were available for trainees to use for review. All practice exercises were optional. The computer program unobtrusively measured the number of exercises to which each participant linked. However, this measure did not indicate the number of questions within the exercises that participants answered. Therefore, it is possible that participants simply went to the exercise and returned to the WBT without actually completing the exercise.

Use of Hyperlinks. Each module contained one hyperlink marked "click here for a helpful hint." These hyperlinks offered advice beyond the training that related to performance on the individual writing assignment. The computer program unobtrusively measured which hyperlinks each participant accessed. The three hyperlinks are listed in Appendix A.

RESULTS

Data Analysis Strategy

Based on my conceptual model and on my hypotheses, there are two major outcomes of interest in this dissertation: motivation to learn and learning. I used two measures of each outcome. I used a direct measure of motivation to learn and the composite variable of valence, instrumentality, and expectancy as two dependent variables. Additionally, I used the dichotomous choice post-test score and the post-test paragraph score as separate variables representing learning. Therefore, in each analysis of direct effects of individual differences, I used four dependent variables.

Descriptive Statistics

The means, standard deviations, and zero-order correlations are presented in Table 2. There are several notable descriptive statistics. First, there are some differences between the two classes that were used as participants. The communications class participants did not score as well on the post-test paragraph as the business class participants. This is most likely due to the content of the paragraph, which is in a business context. It is possible that these students' lack of familiarity with this content made the task of identifying errors more difficult. Another difference between the classes is the affective response after training. The participants from the business class had more positive reactions to the training. Again, this may have been due to the business focus of

Table 2

Means, Standard Deviations, and Zero-Order Intercorrelations

	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
Control Variables	1. Computer Anxiety	2.06	.59	(.88)												
	2. Class	1.16	.37	.10	---											
	3. Gender	.66	.48	.12	-.02	---										
	4. G.P.A.	3.01	.46	-.09	.01	.16*	---									
	5. Hours (Computer)	10.32	8.28	-.38*	.03	.03	.12	---								
	6. Hours (WWW)	4.99	4.99	-.16*	.04	-.09	.08	.44*	---							
	7. Pre-test Paragraph	7.79	4.00	.11	.11	-.21*	-.22*	-.19*	.05	---						
	8. Pre-test	21.51	3.41	-.07	-.04	.20*	.34*	.09	.08	-.30*	---					
	9. Skill	3.38	.74	-.60*	-.04	-.05	.05	.37*	.34*	-.05	-.03	---				
	10. Previous WBT	.17	.38	-.09	-.01	.01	-.03	.21*	.14	.01	.12	.14	---			
†	11. Learner Control	.51	.50	.08	-.17*	.01	.04	-.03	.03	-.02	.05	-.05	.05	---		
Ind Diffs	12. Conscientiousness	3.79	.41	-.18*	.01	.26*	.24*	-.05	-.02	-.03	-.03	.19*	-.06	-.07	(.75)	
	13. Openness	3.40	.44	-.09	.18*	.16*	.19*	.08	-.01	-.11	.15*	.07	.08	.08	.04	(.70)
	14. Mastery Orient.	4.06	.39	-.19*	.00	-.00	.26*	.05	.09	-.01	.04	.12	-.06	-.01	.28*	.24*
	15. Performance Orient.	3.62	.54	-.06	.11	.00	-.07	-.08	-.03	.06	-.04	.01	.04	-.05	.11	-.13
	16. Legit. of Grammar	4.38	.54	-.04	-.01	.01	.14	.07	-.11	-.05	.00	-.04	-.07	-.05	.15*	.07
	17. Legit. of WBT	4.03	.70	-.23*	-.12	.03	-.08	.16*	-.00	-.01	-.05	.22*	.08	-.00	.20*	-.05
Dependent Variables	18. Motivation to Learn	4.00	.65	-.02	-.10	.14	-.05	.00	-.06	.06	-.10	.05	.03	-.05	.12	-.04
	19. V x I x E	72.19	27.88	-.21*	.03	.25*	.20*	.13	-.11	-.16*	.15*	.16*	-.09	-.04	.19*	.07
	20. Valence	4.35	.56	-.12	-.05	.20*	.02	.01	-.03	.01	-.04	.16*	.06	-.05	.08	.02
	21. Instrumentality	4.12	.68	-.16*	.11	.25*	.20*	.08	-.16*	-.16*	.22*	.08	-.01	-.07	.17*	.10
	22. Expectancy	3.89	.83	-.17*	.02	.20*	.17*	.13	-.13	-.16*	.12	.10	-.18*	-.02	.15*	.05
	23. Post-test Paragraph	8.00	4.77	-.04	.18*	-.31*	-.39*	-.14	.03	.71*	-.26*	.02	.00	-.00	-.12	-.03
	24. Post-test	23.64	3.54	-.05	.04	.12	.27*	.08	-.10	-.32*	.42*	.08	-.02	-.00	.08	.18*
	25. Hyperlinks	.98	.95	.04	-.07	.09	.04	-.04	-.19*	-.18*	-.06	-.07	-.02	.06	.11	.17*
	26. Practice	6.09	3.10	-.08	.05	.06	.07	.07	.03	-.04	.08	.05	.07	-.57*	.12	-.02
	27. Affect	3.57	.76	-.05	-.17*	-.00	-.08	.09	-.10	.05	-.04	.01	.11	.09	.06	-.05
	28. Time	47.29	17.53	.08	-.12	.07	-.06	-.00	-.15	-.13	-.05	-.14	.01	-.12	.12	.03
	29. Transfer	1.44	7.85	-.01	---	-.16	-.22*	.00	-.02	.20*	-.33*	.12	-.07	-.04	-.02	.01

Note. N=189. Coefficient alphas are listed parenthetically on the diagonal. *p<.05. † = Treatment

	Variable	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Controls	1. Computer Anxiety															
	2. Class															
	3. Gender															
	4. G.P.A.															
	5. Hours (Computer)															
	6. Hours (WWW)															
	7. Pre-test Paragraph															
	8. Pre-test															
	9. Skill															
	10. Previous WBT															
†	11. Learner Control															
Ind Diffs	12. Conscientiousness															
	13. Openness															
	14. Mastery Orient.	(.76)														
	15. Performance Orient.	.09	(.78)													
	16. Legit. of Grammar	.30*	.18*	(.79)												
	17. Legit. of WBT	.04	.18*	.32*	(.78)											
Dependent Variables	18. Motivation to Learn	.24*	.19*	.46*	.20*	(.91)										
	19. V x I x E	.26*	.09	.30*	.06	.49*	---									
	20. Valence	.22*	.21*	.36*	.21*	.72*	.59*	(.90)								
	21. Instrumentality	.21*	.07	.18*	.01	.27*	.82*	.31*	(.89)							
	22. Expectancy	.16*	-.01	.21*	.00	.29*	.87*	.31*	.62*	(.80)						
	23. Post-test Paragraph	-.05	.05	-.09	-.02	.05	-.09	.03	-.14	-.08	---					
	24. Post-test	.04	-.01	.04	-.07	-.05	.11	.01	.14	.09	-.38*	---				
	25. Hyperlinks	.07	.02	.24*	.16*	.04	.14	.01	.13	.13	-.24*	.17*	---			
	26. Practice	.07	.03	.00	.05	.05	.05	.02	.05	.04	-.01	.12	.13	---		
	27. Affect	.02	.14	.31*	.61*	.13	.09	.13	-.00	.09	-.01	.09	.21*	.11	(.93)	
	28. Time	.04	.05	.19*	.17*	.10	.08	-.01	.05	.09	-.18*	.26*	.35*	.30*	.25*	---
	29. Transfer	.12	-.04	.16	.13	.14	.11	.11	.03	.14	.31*	-.21*	.04	.01	.04	.10

Note. N=189. Coefficient alphas are listed parenthetically on the diagonal. *p<.05. † = Treatment

Of the content. Neither of these differences is important enough to warrant exclusion of the communications class sample, but they do present the need for explanation.

A second set of descriptive statistics that should be explained is the correlations with learner control. The learner control conditions were scored low=0 and high=1. Therefore, the high negative correlation between learner control and frequency of practice indicates that participants in the high learner control condition were less likely to use the practice exercises.

Handling of Missing Data

As in any research study, this experiment lacks some data from respondents. In this study, there are two types of missing data. First, there are instances in which individuals did not complete any items of a scale. In this case, I used the strategy of pairwise deletion to account for this missing data. With this method, only those participants who have data for the variables being analyzed are included in the analysis (Roth, 1994). Therefore, if a participant completed all scales except the conscientiousness scale, his or her data would not be included in an analysis involving conscientiousness, but would be used in all other analyses. One exception to this is in the case of missing time 3 data, which I discussed previously.

Second, there is random missing data from several of the measures. These missing data were generally one or more items that were not completed within a scale. None of the missing data appears to follow a pattern. In other

words, it is not any particular item that seems to be commonly skipped. The strategy I chose to accommodate for this missing data was mean substitution. In mean substitution, the mean value of the variable is entered in place of the missing data. The mean value that I used in was the mean of that missing item across all participants. In other words, if the first item of the conscientiousness scale was missing, I found the mean for that item across all other participants to use as the replacement value. The mean replacement strategy improves the statistical power in this study, but it also provides a conservative estimate of these scores (Roth, 1994). With mean substitution, the mean of the scale remains the same, while the variance is reduced (Roth, 1994).

I used mean substitution for missing data in the following 11 scales: conscientiousness, openness to experience, mastery orientation, performance orientation, computer anxiety, legitimacy of learning grammar, legitimacy of web-based training, motivation to learn, valence, instrumentality, and expectancy. In these scales, there are a total of 67 items. For the 189 participants on the 67 items, I used mean replacement for 566 data points, which is 4.47% of this data from these scales. Mean replacement is typically considered a useful alternative when less than 10% of the data are missing (Roth, 1994).

Test of Overall Significance of Model

Before testing the hypotheses, I tested the overall significance of the model using multivariate multiple regression. Multivariate multiple regression tests the significance of a set of independent variables predicting several

dependent variables. This is an appropriate method to use when a model has correlated multiple dependent variables.

For this analysis, I entered motivation to learn, the composite VIE measure, the post-test score, and the post-test paragraph score as my four dependent variables. These are all moderately correlated with one another (see Table 2). I then entered learner control (the experimental treatment) as the dichotomous factor in this analysis. Finally, I entered the following variables as covariates (predictors): computer anxiety, class, conscientiousness, gender, grade point average, hours spent using World Wide Web, legitimacy perceptions, mastery orientation, openness to experience, performance orientation, pre-test scores, pre-test paragraph scores, skill using computers, and previous experience with web-based training.

A test of between-subjects effects for each of the four dependent variables indicated that motivation to learn ($F=3.87$, $p<.05$), V x I x E ($F=3.50$, $p<.05$), post-test score ($F=8.15$, $p<.05$), and post-test paragraph score ($F=13.47$, $p<.05$) were significantly related to the set of predictors. Therefore, there are significant effects for the model that should be investigated.

Analysis of Hypotheses

I analyzed the direct effects hypotheses using hierarchical multiple regression. I entered the relevant control variables in the first step and the independent variables of interest in the second step.

In order to identify possible control variables to be used in the analyses of each hypothesis, I entered all of the potential control variables first. Those variables that had significant beta weights were retained and the others were dropped. Therefore, there were different control variables used for predicting different dependent variables. When post-test scores were the dependent variable, I controlled for pre-test scores, pre-test paragraph scores, hours spent using the World Wide Web, and self-reported skill using a computer. When post-test paragraph scores were the dependent variable, I used computer anxiety, class, class X learner control, gender, grade point average, and pre-test paragraph scores as control variables. When predicting motivation to learn (direct measure), I controlled for gender. Finally, when predicting the VIE composite, I used gender and hours spent using the World Wide Web as control variables.

Hypothesis 1 predicted that motivation to learn (direct measure of motivation and VIE) would be positively related to learning outcomes (post-test and post-test paragraph). These results are presented in Tables 3, 4, 5, and 6. I expected that individuals who had higher levels of motivation would also learn more in training; however, this hypothesis was not supported. The beta weights indicate that the control variables had significant effects on the dependent variables, but that motivation and VIE did not.

Table 3
Regression Analysis of Motivation to Learn Predicting Post-test Scores (Hypothesis 1)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Hrs (WWW)	**-.16***	**.24***	4, 162	---	**12.43***	**12.43***
Pre-test	**.36***					
Pre-test Para	**-.18***					
Skill	**.04***					
Step 2						
Mot to Learn	-.01	**.24***	1, 161	.00	.03	**9.89***

Note. * p< .05.

Table 4
Regression Analysis of Motivation to Learn Predicting Post-test Paragraph Scores (Hypothesis 1)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Anxiety	**-.13***	**.59***	6, 158	---	**37.63***	**37.63***
Class	**.11***					
Class X LC	**.12***					
Gender	**-.12***					
G.P.A.	**-.21***					
Pre-test Para	**.60***					
Step 2						
Mot to Learn	.04	**.59***	1, 157	.00	.66	**32.28***

Note. * p< .05.

Table 5
Regression Analysis of VIE Predicting Post-test Scores (Hypothesis 1)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Hrs (WWW)	**-.16***	**.24***	4, 162	---	**12.43***	**12.43***
Pre-test	**.36***					
Pre-test Para	**-.18***					
Skill	**.15***					
Step 2						
V x I x E	-.00	**.24***	1, 161	.00	.00	**9.89***

Note. * p< .05.

Table 6
Regression Analysis of VIE Predicting Post-test Paragraph Scores (Hypothesis 1)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Anxiety	**-.12***	**.59***	6, 158	---	**37.63***	**37.63***
Class	**.11***					
Class X LC	**.12***					
Gender	**-.12**					
G.P.A.	**-.22***					
Pre-test Para	**.61***					
Step 2						
V x I x E	.04	**.59***	1, 157	.00	.49	**32.22***

Note. * p< .05.

Next, I predicted that conscientiousness would be positively related to motivation to learn (H2) and learning outcomes (H3). These results are presented in Tables 7-10. Hypothesis 2 was not supported. Conscientiousness was not significantly related to motivation to learn. Hypothesis 3 was also not supported. Conscientiousness did not significantly predict learning above and beyond the effects of the control variables.

Table 7
Regression Analysis of Conscientiousness Predicting Motivation to Learn (Hypothesis 2)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	.12	.02	1, 173	---	**3.38***	**3.38***
Step 2 Consc	.08	.02	1, 172	.01	.92	2.15

Note. * p< .05.

Table 8
Regression Analysis of Conscientiousness Predicting VIE (Hypothesis 2)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.19*** -.09	**.06***	2, 170	---	**5.81***	**5.81***
Step 2 Consc	.13	**.08***	1, 169	.02	3.04	**4.93***

Note. * p< .05.

Table 9
Regression Analysis of Conscientiousness Predicting Post-test Scores (Hypothesis 3)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Hrs (WWW)	**-.15***	**.24***	4, 163	---	**12.56***	**12.56***
Pre-test	**.36***					
Pre-test Para	**-.18***					
Skill	.14					
Step 2						
Consc	.04	**.24***	1, 162	.00	.38	**10.08***

Note. * p< .05.

Table 10
Regression Analysis of Conscientiousness Predicting Post-test Paragraph Scores (Hypothesis 3)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Anxiety	**-.14***	**.59***	6, 159	---	**37.88***	**37.88***
Class	**.11***					
Class X LC	**.11***					
Gender	-.09					
G.P.A.	**-.19***					
Pre-test Para	**.62***					
Step 2						
Consc	-.07	**.59***	1, 158	.00	1.59	**32.81***

Note. * p< .05.

Hypothesis 4 predicted that conscientiousness and learner control would interact to predict motivation to learn. Specifically, I expected that when learner control was high, there would be a stronger relationship between

conscientiousness and motivation to learn. I analyzed this hypothesis using multiple moderated regression. I entered the variables hierarchically in the following manner. I entered the control variables in the first step, the individual difference variable (i.e., conscientiousness) in the second step, the direct effect of the moderator (learner control) in the third step, and the interaction term (conscientiousness X learner control) in the fourth step. In order to have a significant interaction, the change in the F statistic for the fourth step must be significant. The results of the analyses for Hypothesis 4 are presented in Tables 11 and 12. The regression results indicate that the interaction between conscientiousness and learner control was not significant in predicting motivation to learn.

Table 11
Regression Analysis of Conscientiousness X Learner Control Predicting Motivation to Learn (Hypothesis 4)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	.12	.02	1, 173	---	3.38	3.38
Step 2 Consc	-.02	.02	1, 172	.01	.92	2.15
Step 3 Learner Control	-.84	.03	1, 171	.00	.39	1.56
Step 4 Consc X LC	.80	.03	1, 170	.01	1.33	1.50

Note. * $p < .05$.

Table 12
Regression Analysis of Conscientiousness X Learner Control Predicting VIE (Hypothesis 4)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.19*** -.09	**.06***	2, 170	---	**5.81***	**5.81***
Step 2 Consc	.12	**.08***	1, 169	**.02***	**3.76***	**5.19***
Step 3 Learner Control	-.27	**.09***	1, 168	.00	.11	**3.90***
Step 4 Consc X LC	.25	**.09***	1, 167	.00	.13	**3.13***

Note. * p< .05

Hypothesis 5 posited that individuals who were more open to experience would also have higher motivation to learn. Table 13 presents the results for this hypothesis using the direct measure of motivation to learn, and Table 14 presents the results using the VIE composite. This hypothesis was not supported; openness to experience was not significantly related to motivation to learn.

Table 13
Regression Analysis of Openness to Experience Predicting Motivation to Learn (Hypothesis 5)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	**.15***	.02	1, 173	---	3.38	3.38
Step 2 Openness	-.06	.02	1, 172	.00	.67	2.021

Note. * p< .05.

Table 14
Regression Analysis of Openness to Experience Predicting VIE (Hypothesis 5)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.22*** -.09	**.06***	1, 170	---	**5.81***	**5.81***
Step 2 Openness	.04	**.07***	1, 169	.00	.22	**3.93***

Note. * p< .05.

I also predicted that openness to experience would be positively related to learning. The results for Hypothesis 6 are in Tables 15 and 16. This hypothesis was not supported. Openness to experience did not contribute significantly to post-test scores nor to post-test paragraph scores beyond the effects of the control variables.

Table 15
Regression Analysis of Openness to Experience Predicting Post-test Scores (Hypothesis 6)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Hrs (WWW)	**-.16***	**.24***	4, 163	---	**12.56***	**12.56***
Pre-test	**.34***					
Pre-test Para	**-.18***					
Skill	**.14***					
Step 2						
Openness	.10	**.24***	1, 162	.01	1.86	**10.47***

Note. * p< .05.

Table 16
Regression Analysis of Openness to Experience Predicting Post-test Paragraph Scores (Hypothesis 6)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Anxiety	**-.12***	**.59***	6, 159	---	**37.88***	**37.88***
Class	.10					
Class X LC	**.11***					
Gender	**-.12***					
G.P.A.	**-.22***					
Pre-test Para	**.61***					
Step 2						
Openness	.05	**.59***	1, 158	.00	.79	**32.53***

Note. * p< .05.

In addition to the direct effects hypotheses relating openness to experience to the outcome variables, I expected an interaction between openness to experience and learner control. In Hypothesis 7, I predicted that when learner control was high, openness to experience would be more positively related to motivation to learn. In Table 17, I present the results for the interaction predicting the direct measure of motivation to learn. The results for the interaction predicting the VIE composite is in Table 18. Hypothesis 7 was not supported; the interaction terms were not significant in either analysis.

Table 17
Regression Analysis of Openness to Experience X Learner Control Predicting Motivation to Learn (Hypothesis 7)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	.15	.02	1, 173	---	3.38	3.38
Step 2 Openness	-.07	.02	1, 172	.00	.67	2.02
Step 3 Learner Control	-.09	.03	1, 171	.00	.37	1.47
Step 4 Open X LC	.04	.03	1, 170	.00	.01	1.09

Note. * p< .05.

Table 18
Regression Analysis of Openness to Experience X Learner Control Predicting VIE (Hypothesis 7)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.22*** -.09	**.06***	2, 170	---	---	---
Step 2 Openness	.03	**.07***	1, 169	.00	.22	**3.93***
Step 3 Learner Control	-.07	**.07***	1, 168	.00	.21	**2.98***
Step 4 Open X LC	.03	**.07***	1, 167	.00	.00	**2.37***

Note. * p< .05.

Hypotheses 8, 9, and 10 examine the relationship between mastery orientation and training outcomes. In Hypothesis 8, I expected that mastery orientation would be positively related to motivation to learn. These results are presented in Tables 19 and 20. This hypothesis was supported. Mastery orientation was significantly related to motivation to learn (direct measure) and the VIE composite beyond the effects of the control variables.

I predicted that mastery orientation would be positively related to post-test and post-test paragraph scores. These results are presented in Tables 21 and 22, respectively. Mastery orientation did not contribute significantly to learning beyond the effects of the control variables. Therefore, mastery orientation is not predictive of post-test and post-test paragraph scores.

Table 19
Regression Analysis of Mastery Orientation Predicting Motivation to Learn (Hypothesis 8)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	**.14***	.02	1, 173	---	**3.38***	**3.38***
Step 2 Mastery Orient	**.24***	**.08***	1, 172	**.06***	**10.52***	**7.04***

Note. * p< .05.

Table 20
Regression Analysis of Mastery Orientation Predicting VIE (Hypothesis 8)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.23*** .43	**.06***	2, 170	---	**5.81***	**5.81***
Step 2 Mastery Orient	**.29***	**.15***	1, 169	**.09***	**16.62***	**9.77***

Note. * p< .05.

Table 21
Regression Analysis of Mastery Orientation Predicting Post-test Scores (Hypothesis 9)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Hrs (WWW) Pre-test Pre-test Para Skill	**-.15*** **.36*** **-.18*** **.15***	**.24***	4, 163	---	**12.56***	**12.56***
Step 2 Mastery	-.01	**.24***	1, 162	.00	.01	**9.98***

Note. * p< .05.

Table 22
Regression Analysis of Mastery Orientation Predicting Post-test Paragraph Scores (Hypothesis 9)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Anxiety	**-.12***	**.59***	6, 159	---	**37.88***	**37.88***
Class	**.11***					
Class X LC	**.12***					
Gender	**-.11***					
G.P.A.	**.22***					
Pre-test Para	**.61***					
Step 2						
Mastery Orient	.03	**.59***	1, 158	.00	.30	**32.37***

Note. * $p < .05$.

In Hypothesis 10, I expected that learner control would moderate the relationship between mastery orientation and motivation to learn. Specifically, I expected that when learner control was high, mastery orientation would have a stronger relationship with motivation to learn. In the low learner control condition, I expected that mastery orientation would not be as strongly related to motivation to learn. The results of the moderated multiple regression, presented in Tables 23 and 24, indicate that this hypothesis was not supported. The interaction was not significant for either the motivation to learn direct measure or the VIE composite.

Table 23
Regression Analysis of Mastery Orientation X Learner Control Predicting Motivation to Learn (Hypothesis 10)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	**.14***	**.02***	1, 173	---	3.38	3.38
Step 2 Mastery Orient	**.24***	**.08***	1, 172	**.06***	**10.52***	**7.04***
Step 3 Learner Control	-.09	**.08***	1, 171	.00	.58	**4.88***
Step 4 Mastery X LC	.03	**.08***	1, 170	.00	.00	**3.64***

Note. * p< .05.

Table 24
Regression Analysis of Mastery Orientation X Learner Control Predicting VIE (Hypothesis 10)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.23*** -.11	**.06***	2, 170	---	**5.81***	**5.81***
Step 2 Mastery Orient	**.31***	**.15***	1, 169	**.08***	**16.62***	**9.77***
Step 3 Learner Control	.15	**.15***	1, 168	.00	.23	**7.35***
Step 4 Mastery X LC	-.18	**.15***	1, 167	.00	.05	**5.86***

Note. * p< .05.

Hypotheses 11, 12, and 13 predict the relationship of performance orientation with the training outcomes. These predictions are opposite of the mastery orientation hypotheses; I expected performance orientation to be detrimental to motivation and learning. In Hypothesis 11, I predicted that individuals with higher levels of performance orientation would have lower levels of motivation to learn. The results of these analyses, as presented in Tables 25 and 26, indicate a significant relationship that is opposite to predictions. Performance orientation was positively related to the direct measure of motivation to learn. However, this effect was not found using the composite VIE measure as the dependent variable.

Table 25
Regression Analysis of Performance Orientation Predicting Motivation to Learn (Hypothesis 11)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	.14	.02	1, 173	---	3.38	3.38
Step 2 Perf Orient	**.19***	**.06***	1, 172	**.04***	**6.73***	**5.11***

Note. * p< .05.

Table 26
Regression Analysis of Performance Orientation Predicting VIE (Hypothesis 11)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.23*** -.08	**.06***	2, 170	---	**5.81***	**5.81***
Step 2 Perf Orient	.10	**.07***	1, 169	.01	1.84	**4.50***

Note. * p< .05.

I expected that performance orientation would be negatively related to performance on the post-test and post-test paragraph (Hypothesis 12). The results for this regression analysis are presented in Tables 27 and 28. This hypothesis was not supported. Performance orientation was not significantly related to either measure of learning. In fact, the beta weights for performance orientation in these analyses were positive, which is the opposite of the hypothesized direction.

Hypothesis 13 predicted that the interaction between learner control and performance orientation would be significantly related to motivation to learn. The results of the moderated regressions predicting the direct measure of motivation to learn and the VIE composite are presented in Tables 29 and 30, respectively. This hypothesis was not supported; the interaction term did not contribute significantly beyond the direct effects of learner control and performance orientation.

Table 27
Regression Analysis of Performance Orientation Predicting Post-test Scores (Hypothesis 12)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Hrs - WWW	**-.15***	**.24***	4, 163	---	**12.56***	**12.56***
Pre-test	**.36***					
Pre-test Para	**-.18***					
Skill	**.15***					
Step 2						
Perf Orient	.03	**.24***	1, 162	.00	.13	**10.02***

Note. * p< .05.

Table 28
Regression Analysis of Performance Orientation Predicting Post-test Paragraph Scores (Hypothesis 12)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Anxiety	**-.13***	**.59***	6, 159	---	**37.88***	**37.88***
Class	**.11***					
Class X LC	**.12***					
Gender	**-.11***					
G.P.A.	**-.21***					
Pre-test Para	**.61***					
Step 2						
Perf Orient	-.04	**.59***	1, 158	.00	.71	**32.51***

Note. * p< .05.

Table 29
Regression Analysis of Performance Orientation X Learner Control Predicting Motivation to Learn (Hypothesis 13)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	.14	.02	1, 173	---	3.38	3.38
Step 2 Perf Orient	.10	**.06***	1, 172	**.04***	**6.73***	**5.11***
Step 3 Learner Control	-.59	**.06***	1, 171	.00	.31	**3.50***
Step 4 Perf X LC	.56	**.06***	1, 170	.01	1.16	**2.91***

Note. * p< .05.

Table 30
Regression Analysis of Performance Orientation X Learner Control Predicting VIE (Hypothesis 13)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.23*** -.08	**.06***	2, 170	---	**5.81***	**5.81***
Step 2 Perf Orient	.16	**.07***	1, 169	.01	1.84	**4.50***
Step 3 Learner Control	.37	**.08***	1, 168	.00	.11	**3.39***
Step 4 Perf X LC	-.40	**.08***	1, 167	.00	.59	**2.82***

Note. * p< .05.

Hypotheses 14, 15, and 16 addressed the relationships among the perceptions of legitimacy and the training outcomes. As described previously, I split the legitimacy items into two separate measures: (1) perceptions of legitimacy of learning grammar and (2) perceptions of legitimacy of web-based training.

Hypothesis 14 predicted that perceptions of legitimacy would be positively related to motivation to learn. These results, which are presented in Tables 31–34, indicate that this hypothesis was partially supported. Perceptions of legitimacy of learning grammar were positively related to the direct measure of motivation to learn and the VIE composite. However, perceptions of legitimacy of web-based training were not significantly related to motivation to learn.

Table 31
Regression Analysis of Perceptions of Legitimacy of Learning Grammar Predicting Motivation to Learn (Hypothesis 14)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1 Gender	**.15***	**.02***	1, 172	---	**4.07***	**4.07***
Step 2 Legit Grammar	**.46***	**.23***	1, 171	**.21***	**45.87***	**25.50***

Note. * p< .05.

Table 32
Regression Analysis of Perceptions of Legitimacy of Learning Grammar Predicting VIE (Hypothesis 14)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.23*** -.05	**.07***	2, 169	---	**5.85***	**5.85***
Step 2 Legit Grammar	**.30***	**.15***	1, 168	**.09***	**17.77***	**10.21***

Note. * p< .05.

Table 33
Regression Analysis of Perceptions of Legitimacy of WBT Predicting Motivation to Learn (Hypothesis 14)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1 Gender	**.21***	**.04***	1, 172	---	**7.76***	**7.76***
Step 2 Legit WBT	.04	**.05***	1, 171	.00	.29	**4.01***

Note. * p< .05.

Table 34
Regression Analysis of Perceptions of Legitimacy of WBT Predicting VIE (Hypothesis 14)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.23*** -.09	**.07***	2, 169	---	**5.85***	**5.85***
Step 2 Legit WBT	.06	**.07***	1, 168	.00	.66	**4.11***

Note. * p< .05.

Hypothesis 15, which predicted that perceptions of legitimacy would be positively related to learning, was not supported. The results, which are presented in Tables 35-38, indicate that neither the perceptions of the legitimacy of learning grammar nor web-based training were related to post-test and post-test paragraph scores.

Table 35
Regression Analysis of Perceptions of Legitimacy of Learning Grammar Predicting Post-test Scores (Hypothesis 15)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1 Hrs (WWW) Pre-test Pre-test Para Skill	**-.15*** **.36*** **-.18*** **.15***	**.24***	4, 162	---	**12.43***	**12.43***
Step 2 Legit Grammar	.01	**.24***	1, 161	.00	.01	**9.89***

Note. * p< .05.

Table 36
Regression Analysis of Perceptions of Legitimacy of Learning Grammar Predicting Post-test Paragraph Scores (Hypothesis 15)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1 Anxiety Class Class X LC Gender G.P.A. Pre-test Para	**-.13*** **.11*** **.12*** **-.11*** **-.21*** **.61***	**.59***	6, 158	---	**37.63***	**37.63***
Step 2 Legit Grammar	-.02	**.59***	1, 157	.00	.15	**32.11***

Note. * p< .05.

Table 37
Regression Analysis of Perceptions of Legitimacy of WBT Predicting Post-test Scores (Hypothesis 15)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1 Hrs (WWW) Pre-test Pre-test Para Skill	**-.16*** **.36*** **-.18*** **.18***	**.24***	4, 162	---	**12.43***	**12.43***
Step 2 Legit WBT	-.10	**.25***	1, 161	.01	2.16	**10.45***

Note. * p< .05.

Table 38
Regression Analysis of Perceptions of Legitimacy of WBT Predicting Post-test Paragraph Scores (Hypothesis 15)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1						
Anxiety	**-.13***	**.59***	6, 158	---	**37.63***	**37.63***
Class	**.10***					
Class X LC	**.12***					
Gender	**-.11***					
G.P.A.	**-.21***					
Pre-test Para	**.61***					
Step 2						
Legit WBT	-.04	**.59***	1, 157	.00	.45	**32.21***

Note. * p< .05.

Hypothesis 16 predicted that perceptions of legitimacy and learner control would interact to predict motivation to learn. The results of the moderated regression analyses, as presented in Tables 39-42, indicate that this hypothesis was partially supported. In this analysis, the interaction term for learner control X perceptions of legitimacy of web-based training was significant beyond the effects of the control variables and the direct effects.

A plot of this significant interaction appears in Figure 5. As predicted, when learner control was high, perceptions of legitimacy were more strongly related to motivation to learn. Specifically, in the high learner control condition, more positive perceptions of legitimacy were related to higher motivation to learn. Conversely, when learner control was low, the perceptions of legitimacy were not very strongly related to motivation to learn. There was an average level of motivation to learn regardless of the perceptions of legitimacy. This follows

Mischel's (1977) contention that in weak situations, personal characteristics have more of an impact. In other words, in the weak situation of high learner control, a person's perceptions of legitimacy and motivation to learn are more strongly related.

Table 39
Regression Analysis of Perceptions of Legitimacy of Learning Grammar X Learner Control Predicting Motivation to Learn (Hypothesis 16)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	**.15***	**.02***	1, 172	---	**4.07***	**4.07***
Step 2 Legit Grammar	**.42***	**.23***	1, 171	.21*	**45.87***	**25.50***
Step 3 Learner Control	-.27	**.23***	1, 170	.00	.06	**16.93***
Step 4 Legit Grammar X LC	.26	**.23***	1, 169	.00	.20	**12.69***

Note. * p< .05.

Table 40
Regression Analysis of Perceptions of Legitimacy of Learning Grammar X Learner Control Predicting VIE (Hypothesis 16)

	β	R^2		ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.23*** -.04	**.07***	2, 169	---	**5.85***	**5.85***
Step 2 Legit Grammar	.38*	**.15***	1, 168	**.09***	**17.77***	**10.21***
Step 3 Learner Control	.56	**.15***	1, 167	.00	.03	**7.62***
Step 4 Legit Grammar X LC	-.57	**.16***	1, 166	.01	.91	**6.28***

Note. * p< .05.

Table 41
Regression Analysis of Perceptions of Legitimacy of WBT X Learner Control Predicting Motivation to Learn (Hypothesis 16)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender	**.17***	**.02***	1, 172	---	**4.07***	**4.07***
Step 2 Legit WBT	-.11	**.06***	1, 171	**.04***	**6.60***	**5.41***
Step 3 Learner Control	**-1.81***	**.06***	1, 170	.00	.29	**3.69***
Step 4 Legit WBT X LC	**1.82***	**.16***	1, 169	**.09***	**18.84***	**7.76***

Note. * p< .05.

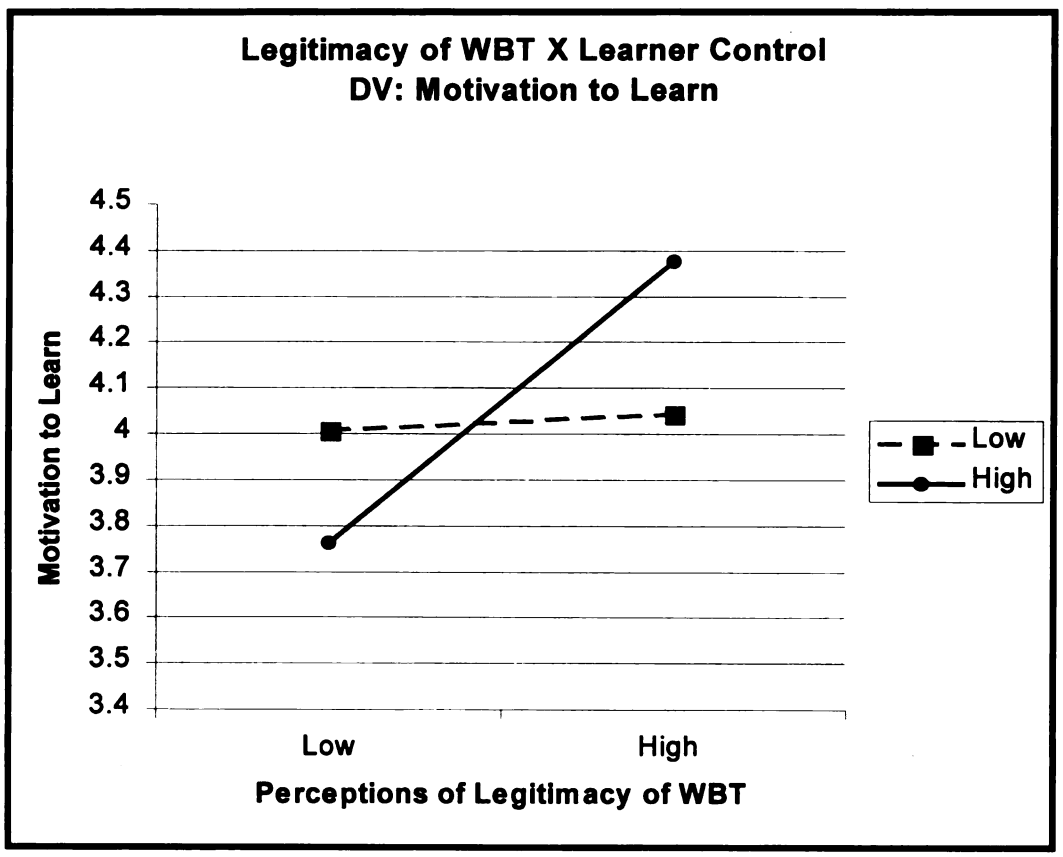
Table 42
Regression Analysis of Perceptions of Legitimacy of WBT X Learner Control Predicting VIE (Hypothesis 16)

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Gender Hrs (WWW)	**.23*** -.09	**.07***	2, 169	---	**5.85***	**5.85***
Step 2 Legit WBT	-.04	**.07***	1, 168	.00	.66	**4.11***
Step 3 Learner Control	-.62	**.07***	1, 167	.00	.14	**3.10***
Step 4 Legit WBT X LC	.61	**.08***	1, 166	.01	1.93	**2.88***

Note. * p< .05.

Figure 5

Plot of Perceptions of Legitimacy of WBT X Learner Control Predicting Motivation to Learn



Additional Hypotheses

Hypothesis 17 predicted that trainees in the high learner control condition would spend less time on training overall than those in the low learner control condition. Learner control and time spent in training were correlated r= -.12 (not significant). The direction of this correlation indicates that trainees in the high learner control condition spent less time in training. A t-test of the mean difference of time spent in training between learners in the high learner control condition and learners in the low learner control condition indicated that there was no significant difference between the means. Therefore, this hypothesis was not supported.

Hypothesis 18 predicted that individuals in the high learner control treatment would have more positive affective outcomes than individuals in the low learner control treatment. Learner control was not significantly correlated with affective outcomes. Therefore, this hypothesis was not supported.

Finally, in Hypothesis 19, I predicted that learning would be related to transfer of training. Specifically, I predicted that the scores on the post-test and on the post-test paragraph would be negatively related to the number of errors in each paper, controlling for length of paper. I used length of paper as a control variable rather than creating a ratio variable of errors divided by length, because the use of a ratio variable for this type of analysis does not provide the appropriate information (Cohen & Cohen, 1983).

The results of this analysis are in Tables 43 and 44. The sample size for this analysis was 132, as only the business course required the assignment that

was used for the transfer of training measure. The results of these analyses indicate that both post-test and post-test paragraph scores were significantly related to transfer of training. In Table 43, the negative beta weights for post-test scores predicting transfer of training indicate that higher learning scores were related to a smaller number of grammar errors in the assignment. In Table 44, the beta weight is positive, indicating that the number of errors on the post-test paragraph was positively related to the number of errors in the subsequent assignment. Therefore, this hypothesis was supported.

Table 43
Regression Analysis of Post-test Scores Predicting Transfer of Training (Hypothesis 19)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1 Paper Length	-.04	.01	1, 130	---	1.25	1.25
Step 2 Post-test	**-.29***	**.09***	1, 129	**.08***	**11.53***	**6.44***

Note. * p< .05.

Table 44
Regression Analysis of Post-test Paragraph Scores Predicting Transfer of Training (Hypothesis 19)

	β	R^2	Df	ΔR^2	F Change	F Overall
Step 1 Paper Length	-.04	.01	1, 130	---	**1.25***	**1.25***
Step 2 Post-test Para	.30	**.10***	1, 129	**.09***	**12.81***	**7.09***

Note. * p< .05.

A summary of these results is presented in Table 45. Of the 19 hypotheses, two were fully supported, and two were partially supported. Specifically, mastery orientation was positively related to motivation to learn, and learning was positively related to transfer of training. There was also partial support for the effects of legitimacy. The perceptions of legitimacy of learning grammar were positively related to motivation to learn, and the perceptions of legitimacy of web-based training interacted with learner control to predict motiyation to learn.

Exploratory Analyses

In this study, I collected data on several variables without making direct hypotheses about them. These variables were tangential to the main research question and conceptual model. I took an exploratory approach to these analyses; they were performed post hoc.

Mediation Analysis

The conceptual model for this dissertation (see Figure 1) implies a mediated model, with individual differences predicting learning through motivation to learn. While this is conceptually logical, the data do not support this relationship. Although several of the individual differences are significantly related to motivation to learn, motivation to learn did not significantly predict

Table 45

Summary of Hypothesized Results

Hypothesis	Predicted Relationship	Outcome
1	Motivation → Learning	Not supported
2	Conscientiousness → Motivation	Not supported
3	Conscientiousness → Learning	Not supported
4	Conscientiousness X Learner Control → Motivation	Not supported
5	Openness → Motivation	Not supported
6	Openness → Learning	Not supported
7	Openness X Learner Control → Motivation	Not supported
8	Mastery Orientation → Motivation	**Supported**
9	Mastery Orientation → Learning	Not supported
10	Mastery Orientation X Learner Control → Motivation	Not supported
11	Performance Orientation → Motivation	Not supported
12	Performance Orientation → Learning	Not supported
13	Performance Orientation X Learner Control → Motivation	Not supported
14	Legitimacy → Motivation	**Partially supported**
15	Legitimacy → Learning	Not supported
16	Legitimacy X Learner Control → Motivation	**Partially supported**
17	Learner control → Time	Not supported
18	Learner control → Affective outcomes	Not supported
19	Learning → Transfer of training	**Supported**

learning beyond the effects of the control variables. Therefore, a mediation analysis was not appropriate for the direct motivation to learn and composite VIE measures. I also examined the effects of the separate valence, instrumentality, and expectancy scales on the post-test and post-test paragraph scores. None of the effects were significant, and again, a mediation analysis was unwarranted.

Use of Practice Exercises and Hyperlinks

Two unique measures that I obtained from my dissertation were the frequency of the use of practice exercises and hyperlinks within the web-based training. These measures may provide useful information about trainees' motivation to learn. While I already measured motivation to learn directly and with valence, instrumentality, and expectancy components, those measures were self-reported. The frequencies of the use of practice exercises and the use of hyperlinks were unobtrusive measures of motivation to learn. Therefore, I believed that it would be interesting to see to what degree they contributed to learning outcomes above and beyond the control variables.

The results for these four exploratory analyses are presented in Tables 46, 47, 48, and 49. I found two significant direct effects for these unobtrusive measures. The number of practice exercises that a trainee used was significant in predicting performance on the post-test but was not related to performance on the post-test paragraph. Whereas the direct measure of motivation to learn and the VIE composite were not significantly predictive of learning, the use of hyperlinks was significantly related to performance on both the post-test and the

post-test paragraph. This indicates that the unobtrusive measures of motivation were predictive of learning outcomes beyond the effects of the control variables.

Table 46
Regression Analysis of Frequency of Use of Practice Exercises Predicting Post-test Scores

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Hrs (WWW) Pre-test Pre-test Para Skill	**-.19*** **.33*** **-.21*** **.16***	**.24***	4, 154	---	**12.12***	**12.12***
Step 2 Practice	.12	**.26***	1, 153	.02	3.12	**10.45***

Note. * p< .05.

Table 47
Regression Analysis of Frequency of Use of Practice Exercises Predicting Post-test Paragraph Scores

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1 Anxiety Class Gender G.P.A. Pre-test Para	**-.13*** **.11*** **-.12*** **-.20*** **.62***	**.77***	5, 151	---	**43.11***	**43.11***
Step 2 Practice	-.03	**.77***	1, 150	.00	.31	**35.81***

Note. * p< .05.

Table 48
Regression Analysis of Frequency of Use of Hyperlinks Predicting Post-test Scores

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Hrs (WWW)	**-.13***	**.24***	4, 163	---	**12.56***	**12.56***
Pre-test	**.38***					
Pre-test Para	**-.16***					
Skill	**.15***					
Step 2						
Hyperlinks	**.16***	**.26***	1, 162	**.02***	**5.00***	**11.29***

Note. * p< .05.

Table 49
Regression Analysis of Frequency of Use of Hyperlinks Predicting Post-test Paragraph Scores

	β	R^2	df	ΔR^2	F Change	F Overall
Step 1						
Anxiety	**-.11***	**.57***	5, 160	---	**43.17***	**43.17***
Class	.10					
Gender	.10					
G.P.A.	**-.20***					
Pre-test Para	**.60***					
Step 2						
Hyperlinks	**-.13***	**-.13***	1, 159	**.02***	**6.55***	**38.32***

Note. * p< .05.

DISCUSSION

Overview of Discussion

This discussion is divided into four parts. First, I summarize the results of the hypothesized and exploratory analyses and consider the implications of these results for theory building. Second, I address the limitations of the study. Third, I provide suggestions for future research in this area. Finally, I consider the practical application of these results.

Summary of Results and Implications for Theory Building

This dissertation was aimed at understanding the extent to which individual differences of learners contributed to learning in different training conditions. Within the context of web-based training, I found that some individual differences influenced learning in both high learner control and low learner control training conditions.

The first hypothesis predicted that motivation to learn would be significantly related to learning outcomes. Surprisingly, this hypothesis was not supported. Noe's (1986) model of motivational influences in training targeted motivation to learn as critical to training success. Many studies have found support for the positive link between motivation and learning (e.g., Colquitt & Simmering, 1998; Quinones, 1995, Warr & Bunce, 1995). Additionally, a recent meta-analysis of motivation to learn found that motivation to learn was

moderately related to declarative knowledge and skill acquisition (Colquitt, LePine, and Noe, under review).

In this study, neither measure of motivation to learn was significantly related to learning. It appears that the majority of the variance explained in learning outcomes was due to pre-test and pre-test paragraph scores. This indicates that, in this case, ability was more predictive than motivation. However, exploratory analyses revealed that two other measures of motivation to learn were significantly related to learning outcomes beyond the effects of the pre-test and pre-test paragraph.

The practice exercises and hyperlinks in this study can be construed as unobtrusive measures of motivation to learn. At no time were participants led to believe that the number of practice exercises used or hyperlinks visited would be known to the researcher. Those participants who voluntarily chose to engage in practice exercises and follow hyperlinks were likely to have been motivated to learn the training material.

The measure of the frequency of the use of practice exercises was positively related to performance on the post-test. This result is not surprising, as the exercises were very similar in content and style to the post-test. The practice exercises appeared to enhance learning beyond the effects of the control variables. I would expect this result in future studies.

I was surprised, however, to find that the use of hyperlinks was significantly related to both post-test and post-test paragraph scores. The content of the hyperlinks was completely unrelated to any material on either post-test

measure (see Appendix A). Therefore, I believe that the use of hyperlinks is a meaningful measure of motivation to learn. This measure is unobtrusive; the trainees did not know that the computer could track their movement within the training.

It is interesting to note that the use of hyperlinks and the number of practice exercises accessed were not significantly correlated with either the direct measures of motivation to learn or the VIE composite. Furthermore, the two unobtrusive measures were not significantly related to the elements of VIE: valence, instrumentality, and expectancy. This leads me to believe that perhaps the self-report data on the direct motivation to learn measures may not have been accurate. Mathieu & Martineau (1997) have noted that direct motivation to learn measures tend to be transparent and susceptible to responses based on impression management or social desirability.

Although VIE measures are generally believed to be less transparent, the results of this study imply that this may not be the case. This could be because the participants have previously been exposed to expectancy theory. The students in the human resource management course are required to take a course in organizational behavior either before or concurrent with the HRM class. This organizational behavior course includes the topic of expectancy theory, in which all three elements are fully explained. Therefore, with this group of participants, it is possible that the VIE measures were also transparent.

An alternate explanation for the participants' use of hyperlinks may be curiosity. Openness to experience, which in part measures curiosity, was

significantly correlated with the use of hyperlinks ($r=.17$, $p<.05$). This correlation may have been higher had the reliability of the openness to experience scale been higher.

Although the links between the self-reported measures of motivation to learn and learning were not supported, it is still interesting to examine the relationship of the individual differences on motivation to learn and learning. I conducted analyses to examine the extent to which the set of individual differences in this study accounted for variance in the dependent variables. I regressed each of the dependent variables on conscientiousness, openness to experience, mastery orientation, performance orientation, legitimacy of grammar, and legitimacy of WBT. Beyond the effects of the control variables, the independent variables accounted for 25% ($p<.05$) of the variance in motivation to learn, 14% ($p<.05$) of the variance in the VIE composite, 3% (non-significant) of the variance in post-test scores, and .8% (non-significant) of the variance in post-test paragraph scores. Therefore, the individual differences had a much stronger effect on motivation than on learning outcomes.

When I examined the effects of each individual difference separately, only one, mastery orientation, was related to learning. The results indicate that trainees who focus on gaining competence are more likely to do well on learning outcomes. This finding adds to the growing literature that reports strong support for the role of mastery orientation in learning outcomes (e.g., Colquitt & Simmering, 1998; Phillips & Gully, 1997).

I was surprised to find that none of the other individual differences were positively related to motivation to learn and learning. Conscientiousness and openness to experience, two of the Big Five factors of personality, were not predictive of motivation to learn or learning. In their meta-analysis of motivation to learn, Colquitt et al. (under review) found a positive relationship between conscientiousness and motivation to learn. This was not replicated in my study. However, I did find a significant correlation ($r=.15$, $p<.05$) between conscientiousness and expectancy. Expectancy, which is an individual's belief in his or her ability to perform a specific task, is indistinguishable from self-efficacy. Colquitt et al. (under review) found a positive relationship between conscientiousness and self-efficacy and between self-efficacy and motivation to learn. Therefore, this study may provide indirect evidence for the relationship between conscientiousness and motivation to learn.

The relationship between openness to experience and learning outcomes has not been previously tested; however, Barrick & Mount (1991) indicated that this factor may be strongly related to performance in training.

There are several possible explanations for these non-significant results. The self-reported measures of motivation to learn appear to have been weak. There is probable restriction in range due to the effects of social desirability. There also is possible restriction of range in the individual difference measures. Because the sample was students who were typically in their third or fourth year of college, these individuals are more likely to be more conscientious than the general public. This sample may not have had a different level of

openness to experience than other samples, but the lack of results may have been due to the low reliability of this measure.

The non-significant results for the performance orientation measure may be due to the nature of the training. The WBT was designed to be done individually and privately. Although it is possible, it is unlikely that many of the participants had others witnessing their performance in training. Therefore, inclinations to perform well in front of others should not have had an effect in this situation.

The results for the perceptions of legitimacy indicated partial support of the hypothesized relationships. Two significant results were found. First, the perceived legitimacy of learning grammar was positively related to motivation to learn as predicted. Second, learner control moderated the relationship between the perceptions of legitimacy of WBT and motivation to learn such that when trainees had high learner control, there was a stronger relationship. In other words, trainees in the low learner control condition had average levels of motivation to learn, despite their perceptions of the legitimacy of WBT. However, those individuals who had high learner control and found the training to be legitimate were much more motivated to learn.

These results present the first investigation of how perceptions of legitimacy relate to motivation to learn. Because this concept was adapted from organizational theory literature, it has not been previously examined in the context of training. This dissertation, therefore, introduces an important new element to understanding what motivates trainees to learn.

I predicted that trainees in the high learner control condition would have more positive affective outcomes and spend less time in training. The results indicated that trainees were not more likely to have positive affective outcomes. Perhaps this is because the level of learner control in this study did not allow for much trainee influence. In a situation in which learners have significantly more control, particularly over the content of training, high learner control may be related to affective outcomes. Similarly, there were no significant differences in the time that trainees in the two conditions spent in training. Again, this was likely due to the weak manipulation of learner control in this study.

My final hypothesis predicted that learning would be related to transfer of training. This hypothesis was supported—trainees who scored better on the post-test and the post-test paragraph made fewer errors in actual writing assignments. Additionally, the post-test paragraph scores contributed slightly more incremental variance explained than the post-test scores. This may be because transfer of training tends to be stronger when there is a perceived similarity between the training and job tasks (Ford & Kraiger, 1995). In this training, the requirements of the post-test paragraph were more similar to the writing assignment than the post-test was.

Limitations

One concern when using students for research participants is that their characteristics are not necessarily representative of individuals in other organizations. They may differ in the following ways: age, education, and

organizational constraints. First, the average age of this sample was estimated to be approximately 21 years of age. Organizations are very likely to have a higher mean age. Second, each participant had at least two years of college education, but probably no more. Individuals in organizations will have a broader range of education. Finally, although these participants experienced a number of constraints related to training (e.g., coursework, jobs, etc.), these may not be similar to constraints experienced by individuals within an organization.

I used samples from two separate courses for this study. This afforded more statistical power, but there were several significant differences between the two groups. I statistically controlled for these group differences in analyses. However, this indicates that the results of these analyses may have differed due to the participants. Therefore, these results are not necessarily generalizable to other samples.

Another limitation of this dissertation is that participation was voluntary, and therefore, some individuals within the class did not participate in the study. There may be some differences between those participants who did engage in the study and those who did not. Those who did not participate may have had lower conscientiousness, and therefore, were not interested in achieving a higher score on their written assignments by going through the grammar lesson. Alternatively, the highly conscientious students could have decided that they were skilled enough in grammar to not need the lesson. Although there may be differences between the group of participants and non-participants, the result of any differences would be to restrict the range of the independent variables within

the sample. That is, there would be less variance on some individual difference variables. This may have led to several of the non-significant findings in this study.

Similarly, the two learner control conditions were not very different. While the definition of learner control indicates that control can vary on three elements—content, pacing, and sequence—I only varied sequence. This restriction was due to internal validity constraints, but still prevents a full investigation of learner control. However, as discussed above, any results found with learner control would only be stronger if the variance of this were to be greater.

Missing data was a limitation of this study. I measured motivation to learn, expectancy, valence, and legitimacy after each module. Although participants were informed that they would be asked to answer the same questions several times, only 38 percent completed the time 3 measures. In the analyses, I used only the time 1 measures of these scales to avoid the missing data problem. However, useful information regarding motivation and legitimacy was lost due to participant fatigue. Additionally, the affective measures may have been affected by dissatisfaction with the study requirements. In the future, one or two time periods should be sufficient for this information.

Another concern is the method for handling missing data within the individual differences scales. I used mean replacement to reduce the amount of missing data, which is an acceptable strategy. However, I replaced each data point with the mean of that item of all other participants. Another strategy is to

replace the data point with the mean of the other scale items for that participant. The method that I used for mean replacement is more conservative and is more likely to reduce the variance. Therefore, replacing the mean in another way may influence the results of this study.

One potential limitation of this study is the absence of information due to the data collection procedure. Because trainees were able to complete training on their own time, outside of the view of any training administrator, there is no guarantee that trainees gave their full attention to the course. For example, trainees could have continued through the content without actually reading it. Additionally, trainees could have accessed the pages of practice exercises without actually completing them. Without knowing more about participation in practice exercises, interpretations of those results must be conservative. Another concern is that participants could have enlisted the help of others in answering questions. Although this is unlikely, it cannot be discounted.

Finally, one result of concern is the small mean difference between the pre-test scores and post-test scores. As a measure of learning, these scores were somewhat weak. I investigated the possibility that there were ceiling effects, but did not believe that this was the case. I believe that a problem with the tests is that they were dichotomous choice. It is likely that trainees can identify correct and incorrect grammar usage in a dichotomous choice situation, but still have problems with their own writing. However, the positive relationship between post-test scores and the frequency of grammar errors indicates that there is a positive relationship between the testing situation and the actual performance context.

Future Research

The findings in this dissertation emphasize the need for future research into several key areas: motivation to learn, learner control, goal orientation, legitimacy, transfer of training, and training media.

Motivation to Learn

The main implication from this dissertation is the need to empirically investigate differences in measures of motivation to learn. Although there have been comparisons of several self-reported measures (Mathieu & Martineau, 1997), my results indicate that there needs to be a comparison of self-reported to unobtrusive measures. Web-based training is a medium that supports the investigation of unobtrusive motivation to learn measures, and therefore, it may be a useful platform for discovering more about the validity of these scales.

Another avenue of investigation in this area is the benefit of using hyperlinks in WBT. In this study, trainees were offered three hyperlinks to aid them in the WBT that provided no content to aid in the cognitive outcome measures. Further studies should investigate the benefits of using hyperlinks with training content. Because hyperlinks are unique to web-based training, their use can provide information necessary to fully evaluate web-based training as an appropriate medium for certain training content. Hyperlinks could be very useful for training related to business, because they could link learners to current business publications, organizations' web pages, or government statistics.

Learner Control

One limitation of this study was the weak manipulation of learner control. A possible confound with content prevented me from being able to emphasize the differences in learner control between the two conditions. Future studies may be able to emphasize the differences between high and low learner control conditions. There are two possibilities for doing so.

One method may be to inform trainees of the level of learner control. In this study, trainees were not only unaware of which learner control condition they experienced, but they also did not know that the two conditions existed. In future studies, informing trainees that they have either more or less control than others may be a useful strategy. One limitation with this method is that the manipulation would have to be checked by measuring the perceived learner control. However, insight into the effects of perceived learner control would also contribute to the literature.

The learner control manipulation could also be made stronger by using a more involved training situation. The training in this study was very short (about one hour), but in a longer, more intense training session, the sequencing and pacing may become more important to learners. For example, if training requires a full eight-hour day, trainees may be more sensitive to the sequencing of material in order to relieve boredom and increase motivation. Additionally, different training content may make sequencing more important to learners.

Pacing, another element of learner control, may also influence the strength of the manipulation. In this study, there were not significant pacing

differences between the two conditions of learner control. However, if pacing can save a significant amount of time, perhaps a manipulation of pacing may be stronger. For example, if a low learner control situation would require a trainee to engage in training for eight hours versus four hours in a high learner control situation, the effects of learner control on motivation and learning might be increased.

In summary, this study unfortunately has not contributed much information to the already divided literature regarding learner control. Although the results suggest that learner control makes little difference to motivation or learning, the weak manipulation may not have been effective in finding any actual effects for the training conditions. In order to appropriately assess the effects of learner control, a stronger manipulation of learner control is warranted.

Goal Orientation

Another topic that should be addressed by future research is goal orientation. In this study, mastery orientation emerged as the only individual difference related to motivation to learn. Additionally, although the results for the performance orientation regression analyses were not significant, there is a significant, positive correlation between performance orientation and the direct measure of motivation to learn. This correlation indicates that predictions that performance orientation would be negatively related to motivation to learn were opposite of what was found. This may be due, as mentioned previously, to the private nature of the task. One element of a performance orientation is the need

to demonstrate competence to others. Because the web-based training was private, there was little or no opportunity for trainees to perform in front of others. Future research should investigate the relationship between performance orientation and motivation to learn in settings that are not private. For instance, if this relationship had been studied using a classroom presentation of grammar skills in which trainee participation was encouraged, perhaps a stronger, positive effect would have been found for performance orientation predicting motivation to learn.

Another avenue of research for goal orientation may be to analyze the effects of mastery orientation and performance orientation together. In this study, I examined the effects of these variables on the dependent variables separately. However, because mastery and performance orientation are considered to be independent of one another, it would be feasible to enter both into the same regression equation to investigate their effects. In particular, an examination of the interaction between mastery and performance orientation would be interesting.

I investigated these effects with exploratory analyses. However, the interaction of the goal orientation measures was not significant for any of the dependent variables (motivation to learn, VIE, post-test score, and post-test paragraph score). However, as stated previously, this task was private, and therefore, it may be difficult to find effects for performance orientation. Future research should be done to try to identify a possible interaction between mastery orientation and performance orientation.

Legitimacy

Legitimacy is a new concept in training, and because of this, there should be increased attention to understanding its role in training. This study indicates that legitimacy is a significant predictor of motivation to learn. However, because of the participants in the study and the content of the training, these effects need to be replicated.

Although perceptions of legitimacy appear to be high in this group of participants (mean=4.38 for grammar and 4.03 for WBT), this may be due in part to range restriction. It is likely that university students are more likely to find learning situations, in general, to be more legitimate. Furthermore, university students may use computers and the World Wide Web more frequently than the general public. Therefore, these perceptions of legitimacy may be lower with employees in general than they are presented here. However, if there is range restriction in this case, I would expect a stronger relationship between perceptions of legitimacy and motivation to learn, as range restriction attenuates correlations.

The sample in this study may have higher mean perceived legitimacy than other samples because this training was voluntary. It is likely that only those individuals who felt that the content and medium were legitimate would participate. Therefore, perceptions of legitimacy should be investigated in situations where trainees are assigned to training. The larger variance in perceptions could produce stronger effects.

The content of the training is also likely to play a role in the mean level of perceived legitimacy of training. Grammar skills may be seen as a remedial topic. The perceptions of legitimacy may change for tasks that are new to the learner. However, the use of web-based training for learning new tasks may not be believed to be as favorable. Therefore, these perceptions should be investigated in other contexts.

In this study, I did not evaluate the origins of perceptions of legitimacy. According to organization theorists, legitimacy can stem from regulations, norms, or cognitive structures (Scott, 1991) or density (Hannan & Carroll, 1992). However, because legitimacy has not been previously investigated in a training situation, there is not enough information about where it originates. Future research should try to identify factors that are related to perceptions of legitimacy. With this understanding, researchers and practitioners can attempt to influence organizational and training characteristics to improve perceptions of legitimacy.

Transfer of Training

In this dissertation, I evaluated the transfer of training and found a positive relationship between learning and transfer. However, because this study was conducted in a university environment, it may not be analogous to a work situation.

In their model of transfer of training, Baldwin & Ford (1988) indicated the importance of the work environment on transfer of training. The work

environment, or the climate for transfer, may be more easily identified and measured in an actual organizational setting. However, with a student sample, this would be very difficult. This study may have provided a positive climate for transfer, as the instructors of the course emphasized the importance of the web-based training for course performance and use in other courses. However, because the climate for transfer was not measured, this remains unknown.

Future research should focus on antecedents of transfer of training other than just performance in training. The characteristics of the trainees, design elements of the training, and the work environment may all play a part in the degree to which learning transfers to the actual job (Baldwin & Ford, 1988).

Training Media

Web-based training is a unique training medium that allows for unobtrusive data collection not available through other media. The results of my study indicate the importance of the unobtrusive measures. Therefore, I would suggest that future studies make use of the benefits of this medium. However, because WBT has not been compared to other training media, this is also a gap in the training literature.

Web-based training is a relatively new medium, and as such, has not been compared to other training media in published research. Two types of comparisons would benefit research in this area. First, a test of WBT versus another self-directed learning medium (e.g., printed materials) would provide information regarding the benefits of each, independent of the level of learner

control. Second, a test of WBT versus a non-self-directed learning environment (e.g., lecture) would provide a global comparison of each method.

One interesting construct that may provide insight into choice of training medium is legitimacy. This dissertation suggests that perceptions of legitimacy contribute to motivation to learn. It is likely that legitimacy will vary depending on the training medium, as some training media are more common than others. Additionally, the content of training may moderate the relationship between the medium and perceptions of legitimacy.

Practical Application

There is limited practical application from this study, since there were few significant effects and small effect sizes (Cohen, 1992). However, there are two areas in which there may be practical application from the results of this dissertation: the importance of the needs assessment and the perceptions of legitimacy.

The results of this study emphasize the need for needs assessment before training. Because some individual differences are related to motivation to learn and learning outcomes, these should be assessed before training is designed. In particular, a mastery orientation measure, if offered as part of the person analysis, may indicate the degree to which trainees are ready to learn.

Improving perceptions of legitimacy may improve training. In order to improve perceptions of legitimacy of learning particular training content, managers must emphasize the link between the trained content and the trainee's

job. The perceptions of the legitimacy of web-based training may be dependent on trainees' experiences with web-based training. Therefore, increased exposure to this new technology may improve motivation to learn.

APPENDIX A

WEB-BASED TRAINING

This appendix presents the web-based training in paper form. There are three content modules: (1) Possessives and Contractions, (2) Sentence Structure, and (3) Word Choice. Each module has three practice exercises. I consulted four texts in writing this web-based training: *Basic Language Skills* (1983), Kaufman (1985a, 1985b), Terban and Marvin (1993).

The presentation of this training on the World Wide Web allowed for access of pages in differing order in the high learner control condition. However, in paper format, this is not possible. Therefore, the content is presented by module in the order in which it was presented in the low learner control treatment. The measures of motivation to learn and legitimacy that were given after each module are presented in Appendix C.

In this appendix, each set of double lines indicates a new page, or screen, of information in the web-based training. Within the WBT, a hyperlink at the bottom of each page that read "continue" allowed the trainee to move to the next page of content.

Possessives

A **possessive noun** tells who or what owns something.

To make a singular word possessive, add an apostrophe and an "s."

Example: That is the manager's briefcase.

Example: The file cabinet's drawers are locked.

There are two ways to make a plural word possessive:

If the word ends in "s," add only an apostrophe.

Example: Three managers' offices are being painted today.

Example: These four computers' keyboards are new.

If the plural does **not** end in an "s," add an apostrophe and an "s."

Example: The men's restroom needs to be cleaned.

Example: The new children's wing of the hospital opens this week.

If the word is a name or a proper noun, the same rules for possessives apply.

Example: Pat's assistant answered the telephone.

Example: We have to consider Korea's import tax.

If a person's name ends in an "s", add an apostrophe and an "s." The same rules apply to last names.

Example: Chris's schedule is very busy today.

Example: Mrs. Davis's computer hasn't been working correctly.

If you are referring to a group of people by their family (or last) name, add an apostrophe after the "s."

Example: The Robinsons' house isn't for sale.

Example: The reception will be held at the Burrows' house.

Pronouns

Pronouns are words that take the place of nouns.

Possessive pronouns show ownership but do **not** use apostrophes.

Example: I put **his** report on the desk.

Example: That computer program is **theirs**.

Example: That diskette is mine; **its** label has my name on it.

Example: I'm not sure **whose** it is.

Contractions

A **contraction** is when two small words are combined into one with an apostrophe to form one word.

Example:

It is very nice of you to help me with this project.

It's very nice of you to help me with this project.

Example:

They are coming to the meeting today.

They're coming to the meeting today.

Example:

Who is in charge of scheduling the meeting?

Who's in charge of scheduling the meeting?

Click here for a **helpful hint.**

Helpful Hint:

The MSU Writing Center helps students improve their grammar and writing style in their class assignments. This is an excellent way for students to get hands-on help with their writing. You can visit the Writing Center in 300 Bessey Hall or contact them on the Internet. You can find the MSU Writing Center's web page by linking to it from the MGT 310 web page.

Return to lesson

To decide whether or not an apostrophe is necessary in a word, follow this rule:

Read words with an apostrophe as if it were two separate words. For example, read "it's" as "it is" in the sentence, and see if the sentence still makes sense. Here are some comparisons between contractions and possessive pronouns.

It's vs. its

"it's" is a contraction of "it is"

It's an excellent compensation plan.

We have to decide if it's a program that is worth pursuing.

"its" is a possessive pronoun

Its main purpose is to provide a wide range of benefits.

We have to decide if its cost savings are large enough to continue the program.

Who's vs. whose

"who's" is a contraction of "who is"

Who's supposed to make a presentation at the meeting?

I'm not sure who's responsible for the mistake.

"whose" is a possessive pronoun

Whose training manual is this?

I don't know whose mistake it was.

they're vs. their

"they're" is a contraction of "they are"

They're recommending that we move the plant to Michigan.

If they think we need more training, they're wrong.

"their" is a possessive pronoun

Their plan for growth is outstanding.

Retaining 90% of employees is their goal.

Possessives and Contractions

Exercise One

Directions: For each sentence, choose the correct word to fill in the blank by using the pull-down menu. Then click on "Check Answer" to see if you are correct. A small gray box that says "JavaScript Alert" will pop up, indicating whether or not your answer was correct.

I think _____ a great plan.	(pull-down menu) • Its • it's	Check Answer
The _____ restroom is around the corner.	(pull-down menu) • womens • women's • womens'	Check Answer
_____ fifteen minutes late for the meeting.	(pull-down menu) • You're • Your	Check Answer
I need to give the memo to Ms. _____.	(pull-down menu) • Jones • Jones' • Jones's	Check Answer
I'm not sure _____ going to attend the meeting.	(pull-down menu) • Whose • who's	Check Answer
_____ books are on the table.	(pull-down menu) • Marcus • Marcus's • Marcuses'	Check Answer

Possessives and Contractions

Exercise Two

Directions: For each sentence, choose the correct word to fill in the blank by using the pull-down menu. Then click on "Check Answer" to see if you are correct. A small gray box that says "JavaScript Alert" will pop up, indicating whether or not your answer was correct.

The computer malfunctioned because I spilled water on ____ keyboard.	(pull-down menu) • its • it's	Check Answer
The _____ office is down the hall	(pull-down menu) • boss • boss's • bosses • bosses'	Check Answer
The _____ decision was a good one.	(pull-down menu) • groups • group's • groups'	Check Answer
Those three _____ projects are due today.	(pull-down menu) • employees • employee's • employees'	Check Answer
I think _____ planning a meeting today.	(pull-down menu) • there • they're • their	Check Answer
The _____ car is in the repair shop.	(pull-down menu) • Reynolds • Reynold's • Reynolds'	Check Answer

Possessives and Contractions

Exercise Three

Directions: For each sentence, choose the correct word to fill in the blank by using the pull-down menu. Then click on "Check Answer" to see if you are correct. A small gray box that says "JavaScript Alert" will pop up, indicating whether or not your answer was correct.

The book isn't mine; it's _____ .	(pull-down menu) • yours • your's • yours'	Check Answer
I'm not sure where _____ office will be.	(pull-down menu) • you're • your	Check Answer
Several _____ names were left off the list.	(pull-down menu) • peoples • people's • peoples'	Check Answer
_____ computer wasn't working?	(pull-down menu) • Whos • Who's • Whose • Whos'	Check Answer
The _____ pages are numbered.	(pull-down menu) • books • book's • books'	Check Answer
That desk is _____ .	(pull-down menu) • Ross • Ross's • Rosses • Rosses'	Check Answer

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Subject and Verb Agreement

A *singular* subject is one in which one person or thing is named. The verb must match the subject.

Example: **She works** eight hours each day at the office.

A *plural* subject is one in which more than one person or thing is named. The verb must match the subject.

Example: **They work** eight hours each day at the office.

Subject and Verb Agreement

Subject and verb agreement becomes more difficult when there is a phrase between the subject and verb.

For correct agreement, read the subject and verb without the phrase to see if it makes sense.

Example: The **list** of options presented in the meeting **is** not complete.

Example: **Neither** of the invited speakers **is** able to attend.

Sentence Fragments

A sentence fragment is a group of word that does not express a complete thought and cannot stand by itself. A complete sentence must have a subject and a main verb.

Examples of sentence fragments:

Sending the paychecks in the mail today.

(There is no subject in this sentence. This doesn't tell who sends the paychecks.)

Omar, who is the new VP of Marketing for our department.

(There is no main verb for this sentence. This describes who Omar is, but not what action he takes.)

Sometimes a complete sentence appears to not have a subject, but is still correct.

Example: Give me that pen.

This is an **imperative** sentence—it makes a request or gives a command. In an imperative sentence, the subject is understood to be **you** even though it is not written.

Example: (You) Give me that pen.

Sentence Fragments

Often clauses are mistaken for complete sentences. A clause is a group of words that has a subject and a predicate.

Subjects are nouns, pronouns, or phrases used as nouns. They tell what the sentence is about—a person, thing, or idea. Predicates tell us about the subject, what the subject does or is.

There are two types of clauses:

Main clauses can stand alone as sentences. **Subordinate clauses** are used with main clauses to express a related idea.

Examples of clauses:

My supervisor let me have the day off.

(This is a main clause.)

My supervisor let me have the day off so that I could take my son to the doctor.

(This is a main clause plus a subordinate clause.)

So that I could take my son to the doctor.

(This is a subordinate clause, and alone, is a sentence fragment.)

Click here for a **helpful hint.**

Helpful Hint:

The MSU library has many books related to grammar. Use the computerized library search system to find reference books on grammar skills, writing style, and citation formats. You can find the library's resources with a link on the MGT 310 web page.

Return to lesson

Sentence Fragments

Sentence fragments can be corrected by adding a main subject and predicate. Here are some examples of sentence fragments and how they can be corrected.

Sentence Fragment: Unless I get a call from you.

Complete Sentence: I won't go unless I get a call from you.

Sentence Fragment: Assuming you have the information you need.

Complete Sentence: You can finish the project, assuming you have the information you need.

Sentence Fragment: A large project, with many employees, clients, and other stakeholders involved.

Complete Sentence: This is a large project, with many employees, clients, and other stakeholders involved.

Sentence Fragment: Julie, who was working in that department for months as a part-time employee.

Complete Sentence: Julie, who was working in that department for months as a part-time employee, was just hired as a full-time employee.

Run-on Sentence

A **run-on sentence** is a sentence that is really two or more sentences that run together without the proper punctuation to join them.

Here are some examples of run-on sentences:

Example: Bring a pencil you will have to take notes.

Example: I want to reduce the budget for research, however, my colleague does not.

Example: I will ask Bill he is a friend of mine.

Example: Several of us are going, we want to get involved.

Run-on Sentences

There are several ways to fix run-on sentence.

First, you must decide what the separate sentences are. Break them apart into two individual sentences.

Run-on Sentence: Take this pen I don't need it.

Sentence 1: Take this pen.

Sentence 2: I don't need it.

You can leave the two sentences as separate to eliminate the run-on sentence.

Second, choose how you will join the sentences: with a semi-colon or with a comma and a conjunction.

Run-on Sentence: Take this pen I don't need it.

Sentence with a semi-colon: Take this pen; I don't need it.

Sentence with a comma and a conjunction: Take this pen, because I don't need it.

Using a comma to join two sentences is not correct. If you can break the sentence into two complete sentences where the comma is, you should use a semi-colon instead of a comma.

Run-on Sentence: I want to start the meeting, however, she would like to wait five minutes.

Correct Sentence: I want to start the meeting; however, she would like to wait five minutes.

Sentence Structure

Exercise One

Directions: For each sentence, decide whether it is grammatically correct or incorrect. Then click on "Check Answer" to see if you are right. A small gray box that says "JavaScript Alert" will pop up, indicating whether or not your answer was right.

Generally speaking, I don't like using e-mail.	(pull-down menu) • Correct • Incorrect	Check Answer
I don't think that's a good idea it's too time consuming.	(pull-down menu) • Correct • Incorrect	Check Answer
I want to go to the meeting; however, I have another commitment.	(pull-down menu) • Correct • Incorrect	Check Answer
The list of options are too long; I can't decide.	(pull-down menu) • Correct • Incorrect	Check Answer
Neither of the managers is willing to lead this project.	(pull-down menu) • Correct • Incorrect	Check Answer
Assuming you don't have a lot of work to do today.	(pull-down menu) • Correct • Incorrect	Check Answer

Sentence Structure

Exercise Two

Directions: For each sentence, decide whether it is grammatically correct or incorrect. Then click on "Check Answer" to see if you are right. A small gray box that says "JavaScript Alert" will pop up, indicating whether or not your answer was right.

A group of managers is waiting in your office.	(pull-down menu) • Correct • Incorrect	Check Answer
The project will be difficult, however, I have confidence that we can do it.	(pull-down menu) • Correct • Incorrect	Check Answer
Because I have to go through several weeks worth of memos that accumulated during my vacation.	(pull-down menu) • Correct • Incorrect	Check Answer
Give me a chance to review the report.	(pull-down menu) • Correct • Incorrect	Check Answer
We began the project last month, now we have to rush to finish it.	(pull-down menu) • Correct • Incorrect	Check Answer
Permission to enter the executive suite of offices is rarely given.	(pull-down menu) • Correct • Incorrect	Check Answer

Sentence Structure

Exercise Three

Directions: For each sentence, decide whether it is grammatically correct or incorrect. Then click on "Check Answer" to see if you are right. A small gray box that says "JavaScript Alert" will pop up, indicating whether or not your answer was right.

A set of keys are missing from the office.	(pull-down menu) • Correct • Incorrect	Check Answer
Let me do it.	(pull-down menu) • Correct • Incorrect	Check Answer
There are many factors to consider like the cost which I think is extremely high.	(pull-down menu) • Correct • Incorrect	Check Answer
For which we want to thank you.	(pull-down menu) • Correct • Incorrect	Check Answer
We might need the report take it with you to the meeting.	(pull-down menu) • Correct • Incorrect	Check Answer
Neither of us needs to attend the meeting.	(pull-down menu) • Correct • Incorrect	Check Answer

---

Homonyms

Homonyms, or homophones, are words that are spelled differently and have different meanings, but are pronounced alike.

The following are several common homonyms:

to is a preposition that means "toward"

Example: I will go **to** the meeting.

too is an a verb that means "also" or "in addition to"

Example: I should go to the meeting **too**.

two is a noun that means the number between one and three

Example: There are **two** meetings today.

Homonyms

weather is the condition of the atmosphere

Example: The **weather** is supposed to be nice tomorrow.

whether means "if" or "either"

Example: I'm not sure **whether** or not I'll go to the meeting.

Homonyms

role is a position in a company or a part in a movie or play

Example: My **role** as a manager is limited.

roll is a list of names

Example: I will call **roll** before we begin.

Homonyms

through means "in one side of something and out the other"

Example: I will go **through** the meeting agenda before we begin.

threw is the past tense of the verb "to throw"

Example: I **threw** a party for the employee who is retiring.

Homonyms

brake is a device for stopping a vehicle

Example: I had to press on the **brake** to stop.

break is a verb that means to make something come apart or a noun that means "to rest"

Example: After this presentation, we can take a **break**.

Homonyms

there means "at or in that place"

Example: I think we should meet **there**.

their means "belonging to them"

Example: We need **their** permission to buy the computer.

Related Words

These words sound and look very much like each other. Because of this they are easily confused and misused.

The following are pairs of words that are commonly misused:

affect is a verb that means "to influence or change"

Example: This plan should **affect** our productivity.

effect is a noun that means "a result or consequence"

Example: The **effect** of the plan was an increase in productivity.

Related Words

moral is an adjective that means "good behavior or character"

Example: It is **moral** to donate money to charity.

morale is a noun that means "the attitude or spirit of a person or group"

Example: The holiday bonus checks should raise the **morale** of the employees.

Related Words

lose is a verb that means "to misplace or fail to win"

Example: If we **lose** the account, I won't get a commission.

loose is an adjective that means "not firmly attached"

Example: The parts on this widget are **loose**.

Click here for a **helpful hint**.

Helpful Hint:

If you are using a computer to write your paper, you can take advantage of the spell checking and grammar checking features. However, remember that the spell checker does not catch words that are spelled correctly, but misused. Make sure that you proofread your paper even if you use the spell checker.

Return to lesson

Related Words

personal is an adjective meaning "private"

Example: I need to miss work for a **personal** reason.

personnel is a noun that refers to people working in a business

Example: We had several complaints from **personnel** in the branch office.

Related Words

accept is a verb meaning "to take what is offered or given"

Example: I will **accept** a job offer if they make one.

except is a preposition that means "leaving out" or "other than"

Example: I agree with everything **except** your last point.

Related Words

then is an adverb meaning "at that time"

Example: We will discuss the project specifications **then**.

than means "in comparison with"

Example: I like the first idea more **than** the second one.

Word Choice

Exercise One

Directions: For each sentence, choose the correct word to fill in the blank by using the pull-down menu. Then click on "Check Answer" to see if you are correct. A small gray box that says "JavaScript Alert" will pop up, indicating whether or not your answer was correct.

I need to "put the _____" on this type of behavior before it reduces productivity.	(pull-down menu) • breaks • brakes	Check Answer
What do you think the _____ of the labor strike will be?	(pull-down menu) • effect • affect	Check Answer
The proposal is a _____ interpretation of what we did last year.	(pull-down menu) • lose • loose	Check Answer
After the three-hour meeting, we'll need a _____.	(pull-down menu) • break • brake	Check Answer
Can you call _____ before we beginthe training session?	(pull-down menu) • roll • role	Check Answer
I hope we don't need it, because I _____ that document away.	(pull-down menu) • through • threw	Check Answer

Word Choice

Exercise Two

Directions: For each sentence, choose the correct word to fill in the blank by using the pull-down menu. Then click on "Check Answer" to see if you are correct. A small gray box that says "JavaScript Alert" will pop up, indicating whether or not your answer was correct.

_____ or not you agree, you have to support me on this.	(pull-down menu) • Whether • Weather	Check Answer
_____ isn't any reason to terminate his employment.	(pull-down menu) • Their • They're • There	Check Answer
I think the first applicat we interviewed would make a better manager _____ the second applicant.	(pull-down menu) • than • then	Check Answer
Many of the employees feel that they are _____ busy since we took on the new account.	(pull-down menu) • to • too • two	Check Answer
Do you think that we can _____ the conditions of their contract?	(pull-down menu) • except • accept	Check Answer
We have a _____ obligation to provide health benefits to our employees.	(pull-down menu) • morale • moral	Check Answer

Word Choice

Exercise Three

Directions: For each sentence, choose the correct word to fill in the blank by using the pull-down menu. Then click on "Check Answer" to see if you are correct. A small gray box that says "JavaScript Alert" will pop up, indicating whether or not your answer was correct.

We have too few _____ to finisht he project on time.	(pull-down menu) • personal • personnel	Check Answer
If we don't submit a lower bid, we could _____ the client.	(pull-down menu) • loose • lose	Check Answer
Employee _____ has suffered ever since the economic recession.	(pull-down menu) • morale • moral	Check Answer
We are having a meeting about that topic next week, so we can discuss it _____.	(pull-down menu) • then • than	Check Answer
_____ for Joe, everyone is here.	(pull-down menu) • Except • Accept	Check Answer
I hope that this merger _____ our position in the market.	(pull-down menu) • affects • effects	Check Answer

APPENDIX B

INFORMED CONSENT FORM

This study is an examination of factors that lead to effective learning in a web-based training program. As a part of this study, you will be asked to complete a personality survey, participate in a web-based training program to learn more about English grammar, and take a short ability test in class. The web-based training program will take approximately 1 hour. Additionally, the grade from your individual paper assignment will be collected (by student number) at the end of the term.

Your participation in this study is purely voluntary, and you may stop at any time. If you choose to participate in this study, you will receive credit for participation points in your MGT 310 class. If you choose not to participate, you can receive participation points for MGT 310 with in-class activities.

In this study, your responses will be confidential. Although you will be identified by your PID in the study database, your name will not be associated with your survey responses or your performance in the training. All data collected from this survey will be presented in aggregate only, and your name will never be attached to the information that you provide. Furthermore, although you will provide answers on the computer, the database for that information is password protected and available only to the study investigators.

As a part of the study, it will be necessary to obtain your grade point average and SAT/ACT score from the registrar. These are only to be used as statistical controls, and only the study investigators will see these data. Your instructor will not see any information related to your grade point average and SAT/ACT scores. Additionally, your instructors will not see any of your answers to any of the questions in the personality survey nor in the training program itself. Any data presented from this study will be in aggregate only, and your name will not be attached to your responses.

If you participate in this study, you will be debriefed approximately 1-3 weeks after your training to explain the purpose of the study and its preliminary results. If you have any questions regarding this project, please contact Marcia Simmering at 517-353-6788, or simmerin@pilot.msu.edu.

Please sign your name below if you would like to participate in this study. By signing, you indicate your voluntary consent to participate in this study.

Signature _____

Name (please print) _____

Student Number _____ Date _____

APPENDIX C

MEASURES

All items will be measured on a five-point Likert scale ranging from "strongly disagree to "strongly agree." Reverse-scored items are indicated by (R).

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

Conscientiousness

1. I keep my belongings clean and neat.
2. I'm pretty good about pacing myself so as to get things done on time.
3. I am not a very methodical person. (R)
4. I try to perform all the tasks assigned to me conscientiously.
5. I have a clear set of goals and I work toward them in an orderly fashion.
6. I waste a lot of time before settling down to work. (R)
7. I work hard to accomplish my goals.
8. When I make a commitment, I can always be counted on to follow through.
9. Sometimes I'm not as dependable or reliable as I should be. (R)
10. I am a productive person who always gets the job done.
11. I never seem to be able to get organized. (R)
12. I strive for excellence in everything I do.

Openness to Experience

1. I don't like to waste my time daydreaming. (R)
2. Once I find the right way to do something, I stick to it. (R)
3. I am intrigued by the patterns I find in art and nature.
4. I believe letting students hear controversial speakers can only confuse and mislead them. (R)
5. Poetry has little or no effect on me. (R) (dropped)
6. I often try new and foreign foods.
7. I seldom notice the moods or feelings that different environments produce. (R)
8. I believe we should look to our religious authorities for decisions on moral issues. (R)
9. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.
10. I have little interest in speculating on the nature of the universe or the human condition. (R)
11. I have a lot of intellectual curiosity.
12. I often enjoy playing with theories or abstract ideas.

Mastery Orientation

1. The opportunity to do challenging work is important to me.
2. When I fail to complete a difficult task, I plan to try harder the next time I work on it.
3. I prefer to work on tasks that force me to learn new things.
4. The opportunity to learn new things is important to me.
5. I do my best when I'm working on a fairly difficult task.
6. When I have difficulty solving a problem, I enjoy trying different approaches to see which one will work.
7. On most jobs, people can pretty much accomplish whatever they set out to accomplish.
8. Your performance on most tasks or jobs increases with the amount of effort you put into them.

Performance Orientation

1. The things I enjoy the most are the things I do the best.
2. The opinions of others have about how well I can do certain things are important to me.
3. I feel smart when I do something without making any mistakes.
4. I like to be fairly confident that I can successfully perform a task before I attempt it.
5. I like to work on tasks that I have done well on in the past.
6. I feel smart when I can do something better than most other people.

7. Even if I know that I did a good job on something, I'm satisfied only if others recognize my accomplishments.
8. It's important to impress others by doing a good job.

Legitimacy

1. I think training on the computer is a good idea.
2. This training is a legitimate way to learn more about grammar.
3. I think grammar lessons should be available for college students.
4. It is legitimate to have college students trained in grammar skills.
5. Web-based training is a useful training method.
6. Grammar skills are important for college students to learn.

Motivation to Learn (direct measure)

1. I will exert considerable effort to learn the training material.
2. Learning the training material is important to me.
3. I will try hard to learn the training material.
4. It is very important to me to learn the training material.

Valence

Listed below are a number of events which are related to this training. For each one, please indicate how desirable it is to you. Please use the following scale.

1	2	3	4	5
Undesirable		Neutral		Desirable

1. Getting a good grade in MGT 310/COM 440.
2. Doing well on writing assignments.
3. Achieving success in the training.
4. Doing well in training.
5. Learning the training material.
6. Trying hard.
7. Putting forth effort.

Instrumentality

Below you will see a number of pairs of factors that look like this:

Example: Warm weather → Sweating

Please indicate how true you feel that it is for you personally that the first word leads to the second word. Please use the following numbers to represent different feelings about how often the first word leads to the second:

1	*2*	*3*	*4*	*5*
Rarely		*Sometimes*		*Usually*

1. Learning the training material → Performing well in training
2. Learning the training material → Achieving success in training
3. Learning the training material → Doing well in training

Expectancy

Below you will see a number of pairs of factors that look like this:

Example: Warm weather → Sweating

Please indicate how true you feel that it is for you personally that the first word leads to the second word. Please use the following numbers to represent different feelings about how often the first word leads to the second:

1	*2*	*3*	*4*	*5*
Rarely		*Sometimes*		*Usually*

1. Trying hard → Learning the training material
2. Putting forth effort → Understanding the training material

Affective Outcomes

1. I am satisfied with this training.
2. I would be interested in participating in web-based training in the future.
3. I believe that this training was worthwhile.
4. I enjoyed this training.
5. I would be interested in participating in web-based training in the future.
6. I think other writing classes should use this web-based training program.
7. I would recommend this training program to students in other writing classes.
8. I think web-based training should be offered more frequently.

Other Variables

1. Approximately how many hours per week do you spend using a computer for any reason? _____
2. Approximately how many hours per week do you use the internet (world wide web) for any reason? _____
3. Have you ever participated in web-based training before? _____
4. Please rate your computer skills:

1	2	3	4	5
Poor		Average		Excellent

5. How comfortable are you using a web browser (like "Netscape" or "Internet Explorer")?

1	2	3	4	5
Poor		Average		Excellent

6. What is your gender? _____ Male _____ Female
7. Where are you right now? _____ Home _____ MSU computer lab _____ other
8. What is your primary (native) language? _____
9. If you are bilingual, what is your secondary language? _____
10. What is your major? _____
11. What is your grade point average (e.g., 2.85) _____

Computer Anxiety

1. I am confident that I can learn computer skills. (R)
2. I am unsure of my ability to interpret computer output.
3. I will be able to keep up with the important technical advances of computers. (R)
4. I can understand most technical matters. (R)
5. I feel apprehensive about using a computer.
6. I'm afraid I might damage a computer in some way.
7. Computer terminology makes sense to me. (R)
8. I have avoided computers because they are unfamiliar to me.
9. I am confident that I can correct most mistakes that I make on a computer. (R)

APPENDIX D

PRE-TESTS/POST-TESTS

Dichotomous Choice Pre-Test/Post-Test

Please indicate whether or not the italicized word is used correctly in the sentences below. Use the mouse to click on the circle for the answer that you choose.

1. If we throw a picnic, we can boost team *moral*.

_____ correct
_____ incorrect

2. I suggest that we turn down the contract; *it's* too risky to accept a project that large with our current shortage of workers.

_____ correct
_____ incorrect

3. The five *students'* papers were in the office.

_____ correct
_____ incorrect

4. The project will *loose* money if it isn't managed well.

_____ correct
_____ incorrect

5. We can take a *brake* after the next speaker presents his proposal.

_____ correct
_____ incorrect

6. I wonder *who's* notebook this is.

_____ correct
_____ incorrect

7. I don't know where *your* book is.

_____ correct
_____ incorrect

8. I assigned four more people to the development team because *they're* projects are behind schedule.

_____ correct
_____ incorrect

9. I want to proofread my paper one more time before I attend my *professor's* office hours tomorrow.

_____ correct
_____ incorrect

10. In recent years, there has been an emphasis on development of new products rather then on updating previous ones.

_____ correct
_____ incorrect

11. The dog left *its* footprints on the carpet.

_____ correct
_____ incorrect

12. Please inform all *personal* that the new casual Friday policy begins this week.

_____ correct
_____ incorrect

13. We hope that the wage raise will *effect* job satisfaction.

_____ correct
_____ incorrect

14. All of the students are here *accept* Mary.

_____ correct
_____ incorrect

15. I think that project will be *to* expensive.

_____ correct
_____ incorrect

16. The *bus's* windows are broken.

_____ correct
_____ incorrect

17. The *women's* restroom is on the third floor.

_____ correct
_____ incorrect

18. After the company was acquired last year, my *roll* in the department changed to one of a consultant.

_____ correct
_____ incorrect

19. That is Mr. *Jones's* wallet.

_____ correct
_____ incorrect

20. The *book's* title is too long.

_____ correct
_____ incorrect

Indicate whether or not the sentence is grammatically correct or incorrect by clicking on the appropriate circles below.

21. Considering all that we have to do today.

_____ correct
_____ incorrect

22. Recruitment has improved; however, we still don't have enough applicants for the position.

_____ correct
_____ incorrect

23. Access to floors three, four, and five are limited after 5 p.m.

_____ correct
_____ incorrect

24. In order to fully understand the proposal that Laura submitted.

_____ correct
_____ incorrect

25. The list of students who want to participate are on the desk.

_____ correct
_____ incorrect

26. I liked having her on my team, she was a good employee.

_____ correct
_____ incorrect

27. Sitting at the corner, waiting for a ride.

_____ correct
_____ incorrect

28. Neither of us wants to have to fire him.

_____ correct
_____ incorrect

29. I wrote my paper last night it was really hard to finish.

_____ correct
_____ incorrect

30. Ann, a capable student that I had in class.

_____ correct
_____ incorrect

Pre-Test Paragraph

Read the following memo and answer the questions below.

I propose that we begin a new recruitment program to attract college students to our company. The group of students' at the local university have a reputation for working hard, which is impressive. Considering all the pressures they have. I know that the local college is Mr. Jones' alma mater, he always has good things to say about the students.

We should get a list of student's who are interested in the positions our department has. I suggest that we ask for there resumes ahead of time and then invite some of them for visits to our company. I think the job applicants' visits should take place on Fridays so they can see our relaxed, casual atmosphere. Bringing in students should also raise the moral of the employee's. Since they want more personnel because they have been complaining about to much work. It will also be a nice brake for the employees because we can have some of them give the applicants' tours.

Its not to late to invite some students this fall, we can request resumes this week. We may loose some applicants because other companies have started to recruit, but not too many. If you like this idea, tell me, I will send a memo to our supervisors secretary. We can than work threw the human resource management office to set up the visits.

Please answer the following questions using numbers only (example: 3). If there are none, enter a '0'.

How many sentence fragments are in the memo? _____

How many run-on sentences are in the memo? _____

How many incorrect examples of subject-verb agreement are in the memo? _____

How many times were apostrophes used incorrectly in the memo? _____

How many times were necessary apostrophes omitted in the memo? _____

How many incorrect word choices (e.g., homonyms and related words) were made in the memo? _____

APPENDIX E

INDIVIDUAL PAPER ASSIGNMENT

The individual paper serves two purposes: to develop your skills in finding and analyzing information about HRM issues, and to improve your business writing skills. In order to meet this second goal, you will submit a first draft of the paper, which will be evaluated with respect to both content and writing style. You will then be asked to revise the paper. Grades will be assigned to each version based on writing style and HR content.

The individual writing assignment involves analysis of a current event that has implications for human resource management. The HR world is constantly changing. Globalization, increasing diversity of the workforce, and competitive pressures all cause organizations to search for (and, to an extent, experiment with) new HR techniques. At the same time, legislation in the U.S. and abroad has direct and indirect influences on HR

For this assignment, you are to select an article from your readings of the popular or business press that deals with an HR issue, and prepare a brief "position paper" describing how (or whether) this issue should influence human resource management practices in business. Business Week, Fortune, The Wall Street Journal, The New York Times, Workforce, and HRMagazine are examples of publications that frequently carry articles about HR-related issues. We will give examples of appropriate articles in class.

The format for this assignment is as follows: You are to take the role of a newly hired graduate in a large firm with facilities in the United States and abroad. One day, as you are riding the elevator with your boss, he/she says: "You know, I saw something on the news the other day about (your topic). Aren't you something of an expert in this area? What do you know about this issue? How do you think it will affect this company? Get back to me with an update. If it's good, I'll send it out to our HR staff and mangers across the company"

You are to respond to this manager with a memo, no longer than 6 pages *double-spaced*, that involves the following components: (1) a *brief* summary of the issues as reported in the article; (2) a more in-depth discussion of the issue, based on your own research into the topic (i.e., you will need to gather more resources than just the one article); (3) your analysis of how this issue might affect a specific company (feel free to make assumptions about the company's business, workforce, locations etc. as needed); and (4) *your* opinion regarding what steps, if any, the company should currently take to address this issue.

Please submit a copy of the original article along with your analysis. The first draft of this written analysis will be due February 25 for all students. Remember, it is worth 15% of your grade, so it is *not* in your best interest to take the first draft lightly. The second draft will be due March 30.

REFERENCES

Arvey, R.D., & Cole. 1989. Evaluating change due to training. In I.L. Goldstein (Ed.) Training and Development in Organizations. San Francisco: Jossey-Bass.

Avner, A., Moore, C., & Smith, S. (1980). Active external control: A basis for superiority of CBI. Journal of Computer-Based Instruction, 6, 115-118.

Baldwin, T.T., & Ford, J.K. (1988). Transfer of training: A review and directions for future research. Personnel Psychology, 41, 63-105.

Baldwin, T.T., Magjuka, R.J., & Loher, B.T. (1991). The perils of participation: Effects of choice of training on trainee motivation and learning. Personnel Psychology, 44, 51-65.

Barrick, M.R. & Mount, M.K. (1991). The big five personality dimensions and job performance: A meta analysis. Personnel Psychology, 44, 1-26.

Barrick, M.R. & Mount, M.K. (1993). Autonomy as a moderator of the relationships between the big five personality dimensions and job performance. Journal of Applied Psychology, 78, 111-118.

Basic language skills. (1983). Englewood Cliffs, NJ: Regents/Prentice Hall.

Button, S.B., Mathieu, J.E., & Zajac, D.M. (1996). Goal orientation in organizational research: A conceptual and empirical foundation. Organizational Behavior and Human Decision Processes, 67, 26-48.

Canterucci, J. (1997). Intranet security. Training & Development, February, 47.

Cohen, J. & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences (2nd edition). Hillsdale, NJ: Lawrence Erlbaum Associates.

Cohen, J. (1992). A power primer. Psychological Bulletin, 11(1), 155-159.

Cohen, S. (1997). Intranets uncovered. Training & Development, February, 48-50.

Colquitt, J.A., LePine, J.A., & Noe, R.A. (1999). Trainee attributes and attitudes revisited: A meta-analytic structural equation modeling analysis of research on training motivation. Manuscript submitted for publication.

Colquitt, J.A. & Simmering, M.J. (1998). Conscientiousness, goal orientation, and motivation to learn during the learning process: A longitudinal study. Journal of Applied Psychology, 83(4).

Cook, T.D. & Campbell, D.T. (1979). Quasi-experimentation: Design and analysis issues for field settings. Boston, MA: Houghton Mifflin Company.

Cornell, R. & Martin, B.L. (1997). The role of motivation in web-based instruction. In B.H. Khan (Ed.), Web-Based Instruction (pp. 93-100). Englewood Cliffs, NJ: Educational Technology Publications.

Costa,P.T. Jr., & McCrae, R.R. (1992). The NEO-PI professional manual. Odessa, FL: Psychological Assessment Resources.

Craiger, J.P. & Weiss, R.J. Traveling in cyberspace: Web-based instruction. TIP.

Curtin, C. (1997). Getting off to a good start on intranets. Training & Development, February, 42-46.

Dillon, W.R., & Goldstein, M. (1984). Multivariate analysis: Methods and applications. New York: John Wiley & Sons.

Dweck, C.S. (1975). The role of expectation and attributions in the alleviation of learned helplessness. Journal of Personality and Social Psychology, 31, 674-685.

Dweck, C.S. (1986). Motivational processes affecting learning. American Psychologist, 41, 1040-1048.

Elliott, E.S., & Dweck, C.S. (1988). Goals: An approach to motivation and achievement. Journal of Personality and Social Psychology, 54, 5-12.

Filipczak, B. (1996). Training on intranets: The hope and the hype. Training, September, 24-32.

Fisher, S.L., & Ford, J.K. (1998). Differential effects of learner effort and goal orientation on two learning outcomes. Personnel Psychology, 5, 397-419.

Fleishman, E.A. & Mumford, M.D. (1989). Individual attributes and training performance. In I.L. Goldstein and associates (Eds.) Training and development in organizations (pp. 183-255). San Francisco, CA: Jossey-Bass Publishers.

Ford, J.K., & Kraiger, K. (1995). The application of cognitive constructs and principles to the instructional systems model of training: Implications for needs assessment, design, and transfer. International Review of Industrial and Organizational Psychology, 10, 1 - 48.

Gagne, R.M. (1985). The conditions of learning and theory of instruction. New York: Holt, Rinehart, and Winston.

Gagne, R.M., & Medsker, K.L. (1996). The conditions of learning: Training applications. Forth Worth, TX: Harcourt Brace.

Gellatly, I.R. (1996). Conscientiousness and task performance: Test of a cognitive process model. Journal of Applied Psychology, 81(5), 474-482.

Golstein, I.L. & Gilliam, P. (1990). Training system issues in the year 2000. American Psychologist, 45(2), 134-143.

Hannan, M.T. & Carroll, G.R. (1992). Dynamics of organizational populations. Oxford: Oxford University Press.

Howard, A. (1995). A framework for work change. In A. Howard (Ed.), The Changing Nature of Work, (pp. 3-44). San Francisco, CA: Jossey-Bass, Inc.

Howell, A.E., Mullins, M.E., Fisher, S.L., Schmitt, N., & Kozlowski, S.W.J. (1998, April). Using the internet for competitive advantage. Paper presented at the 13th Annual Meeting of the Society for Industrial and Organizational Psychology, Dallas, TX.

Kaufman, J. (1985a). Mastering grammar: Book 1. Cambridge Review Series. Prentice Hall.

Kaufman, J. (1985b). Mastering grammar: Book 2. Cambridge Review Series. Prentice Hall.

Keller, J.M. (1983). Motivational design of instruction. In C.M. Reigeluth (Ed.), Instructional-Design Theories and Models: An Overview of their Current Status (pp. 383-434). Hilldsdale, NJ: Lawrence Erlbaum Associates.

Khan, B.H. (1997). Web-based instruction (WBI):What is it and why is it? In B.H. Khan (Ed.) Web-Based Instruction (pp. 5-18). Englewood Cliffs, NJ: Educational Technology Publications.

Kinzie, M.B. (1990). Requirements and benefits of effective interactive instruction: Learner control, self regulation, and continuing motivation. Educational Technology Research and Design, 38,1-21.

Kinzie, M.B., Sullivan, H.J., & Berdel, R.L. (1988). Learner control and achievement in science computer-assisted instruction. Journal of Educational Psychology, 80, 299-303.

Kraiger, K., Ford, J.K., & Salas, E. (1993). Application of cognitive, skill-based, and affective theories of learning outcomes to new methods of training evaluation. Journal of Applied Psychology, 78(2), 311-328.

Lawler, E.E., III, & Suttle, J.L. (1973). Expectancy theory and job behavior. Organizational Behavior and Human Performance, 9, 482-503.

Lee, S.S. & Lee, Y.H.K. (1991). Effects of learner-control versus program-control strategies on computer-aided learning of chemistry problems: For acquisition or review? Journal of Educational Psychology, 83, 491-498.

London, M. & Bassman, E. (1989). Retraining midcareer workers for the future workplace. In I.L. Goldstein and associates (Eds.) Training and development in organizations (pp. 333-375). San Francisco, CA: Jossey-Bass Publishers.

Martocchio, J.J. (1992). Microcomputer usage as an opportunity: The influence of context in employee training. Personnel Psychology, 45, 529-552.

Martocchio, J.J. (1994). Effects of conceptions of ability on anxiety, self-efficacy, and learning in training. Journal of Applied Psychology, 79(6), 819-825.

Martocchio, J.J. & Judge, T.A. (1996). The role of conscientiousness in employee training: A test of alternative models. Paper presented at the Eleventh Annual Conference of the Society for Industrial and Organizational Psychology, San Diego, CA.

Martocchio, J.J. & Webster, J. (1992). Effects of feedback and cognitive playfulness of performance in microcomputer software training. Personnel Psychology, 45, 553-578.

Mathieu, J.E., & Martineau, J.W. (1997). Individual and situational influences on training motivation. Improving Training Effectiveness in Work Organizations. Mahwah, NJ: Lawrence Erlbaum Associates.

Mathieu, J.E., Tannenbaum, S.I, & Salas, E. Influences of individual and situational characteristics on measures of training effectiveness. Academy of Management Journal, 35, 828-847.

Milhelm, W.D. & Martin, B.L. (1991). Theoretical bases for the use of learner control: Three different perspectives. Journal of Computer-Based Instruction, 18, 99-105.

Mischel, W. (1977). The interaction of person and situation. In D. Magnusson & N.S. Endler (Eds.), Personality at the crossroads: Current issues in interactional psychology (pp. 333-352). Hillsdale, NJ: Erlbaum.

Murphy, M.A. & Davidson, G.V. (1991). Computer-based adaptive instruction: Effects of learner control on concept learning. Journal of Computer-Based Instruction, 18, 51-56.

Murrell, A.J. & Sprinkle, J. (1993). The impact of negative attitudes toward computers on employees' satisfaction and commitment within a small company. Computers in Human Behavior, 9, 57-61.

Noe, R.A. (1986). Trainees' attributes and attitudes: Neglected influences on training effectiveness. Academy of Management Review, 11, 736-749.

Noe, R.A. & Ford, J.K. (1992). Emerging issues and new directions for training research. Research in Personnel and Human Resources Management, 10, 345-384.

Noe, R.A., & Schmitt, N. (1986). The influence of trainee attitudes on training effectiveness: Test of a model. Personnel Psychology, 39, 497-523.

Pear, J.J. & Novak, M. (1996). Computer-aided personalized system of instruction: A program evaluation. Computers in Teaching, 23(2), 119-123.

Phillips, J.M. & Gully, S.M. (1997). Role of goal orientation, ability, need for achievement, and locus of control in the self-efficacy and goal-setting process. Journal of Applied Psychology, 82(5), 792-802.

Pollack, C. & Masters, R. (1997). Using internet technologies to enhance training. Performance Improvement, February, 28-31.

Pollack, J.C. & Sullivan, H.J. (1990). Practice model and learner control in computer-based instruction. Contemporary Educational Psychology, 15, 251-260.

Pridemore, D.R. & Klein, J.D. (1991). Control of feedback in computer-assisted instruction. Educational Technology Research and Development, 39, 27-32.

Quinones, M.A. (1995). Pretraining context effects: Training assignment as feedback. Journal of Applied Psychology, 80, 226-238.

Ray, N.M. & Minch, R.P. (1991). Computer anxiety and alientation: Toward a definitive and parsimonious measure. Human Factors, 32, 477-491.

Reiser, R.A., & Gagne, R.M. (1983). Selecting media for instruction. Englewood Cliffs, NJ: Educational Technology Publications.

Ross, S.M. & Morrison, G.R. In search of a happy medium in instructional technology research: Issues concerning external validity media replications, and learner control. Educational Technology Research and Development, 37, 19-33.

Roth, P.L. (1994). Missing data: A conceptual review for applied psychologists. Personnel Psychology, 47, 537-560.

Salthouse, T.A. (1991). Mediation of adult age differences in cognition by reductions in working memory and speed of processing. Psychological Science, 2(3), 179-183.

Scott, W.R. (1991). Institutions and organizations. Thousand Oaks, CA: Sage Publications, Inc.

Shaw, D.S. (1992). Computer-aided instruction for adult professionals: A research report. Journal of Computer-Based Instruction, 19(2), 54-57.

Snow, R.E. (1978). Theory and method for research on aptitude processes. Intelligence, 2, 225-278.

Snow, R.E., & Lohman, D.F. (1984). Toward a theory of cognitive aptitude for learning from instruction. Journal of Educational Psychology, 76, 347-376.

Steinberg, E.R. (1977). Review of student control in computer-assisted instruction. Journal of Computer-Based Instruction, 3, 84-90.

Stevens, L. (1996). The intranet: Your newest training tool? Personnel Journal, July, 2-32.

Terban, M. (1993). Checking your grammar. New York: Scholastic, Inc.

Turnage, J.J. (1990). The challenge of new workplace technology for psychology. American Psychologist, 45(2), 171-178.

Vroom, V.H. (1964). Work and motivation. New York: Wiley.

Warr, P. & Bunce, D. (1995). Trainee characteristics and the outcomes of open learning. Personnel Psychology, 48, 347-375.

Webster, J. & Martocchio, J.J. (1995). The differential effects of software training previews on training outcomes. Journal of Management, 21(4), 757-787.

Wexley, K.N., & Latham, G.P. (1981). Developing and training human resources in organizations. Glenview, IL: Scott Foresman.

Wilder, G., Mackie, D., & Cooper, J. (1985). Gender and computers: Two surveys of computer-related attitudes. Sex Roles, 13(3/4), 215-228.

Wine, J. (1971). Test anxiety and direction of attention. Psychological Bulletin, 76(2), 92-104.

Worthington, E.L., Jr., Welsh, J.A., Archer, C.R., Mindes, E.J., & Forsyth, D.R. (1996). Computer-assisted instruction as a supplement to lectures in an introductory psychology class. Computers in Teaching, 23(3), 175-181.

Wulf, K. (1996). Training via the internet. Training & Development, May, 50-55.

Yang, C.S. & Moore, D.M. (1995-6). Designing hypermedia systems for instruction. Journal of Educational Technology Systems, 24(1), 3-30.

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