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A COMPARISON OF THREE TRAINING METHODS ON THE ACQUISITION
AND RETENTION OF AUTOMOTIVE PRODUCT KNOWLEDGE

by

Rhiannon M. Fante

A Dissertation
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Doctor of Philosophy
Department of Psychology
Dr. Alyce M. Dickinson, Advisor

Western Michigan University
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INTRODUCTION

Organizations spend billions of dollars each year on various training and development programs (Dolezalek, 2005). In fact, organizations are spending anywhere between \$30 billion to \$300 billion annually on formal training programs (Pfau & Kay, 2002). Businesses are investing these unprecedented amounts in training with the expectation that they will lead to organizational performance improvement (Salas & Cannon-Bowers, 2001). Performance improvement is the primary goal of training and is thus fundamental in judging its success (Kozlowski, Brown, Weissbein, Cannon-Bowers, & Salas, 2000). Although evaluating training ranks high with top management as a means to justify its investments (Hashim, 2001), a training program's success is typically measured by the number of employees trained rather than by the extent to which organizational performance improves. If a high number of employees are trained then the training is considered successful (Dutkowsky, 2007).

Perhaps not surprisingly given the above, recent best practice guidelines for training consultants stress evaluation (Bober & Bartlett, 2004). While it is important for consultants to identify weaknesses in learning objectives, training materials, and training methods and eliminate them, this is no longer sufficient. Rather, businesses are interested in knowing how well newly trained skills transfer to the job and how well performance improves, and consultants need to provide those data. Although this type of evaluation can be extremely difficult, it is essential for demonstrating the value of training investments (McLean, 2005).

The current literature on training evaluation is based on evaluation models that focus on training outcomes. These models include Kirkpatrick's (1998) four-level taxonomy, Swanson and Holton's (1999) work on performance improvement, Phillip's (2003) five-level model, and several other models (e.g., Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997; Russ-Eft & Preskill, 2001, 2005). The types of outcomes that are evaluated may be classified into three types: (a) cognitive, evaluating attitudes and depth of understanding; (b) behavioral, evaluating behavioral changes; and (c) performance improvement, evaluating performance to provide the rationale for investing in training (Garvin, 1995). As businesses continue to pressure trainers to demonstrate the performance outcomes of their training programs, the latter type of outcome evaluation, performance improvement, is becoming a necessity (Holton, Bates, & Naquin, 2000).

Because training must transfer to the job in order for it to affect performance, it is one aspect of training evaluation that is of great concern to organizations (Burke, 2001; Ford & Weissbein, 1997; Machin, 2002). Transfer of training can be defined as the extent to which employees apply the knowledge and skills acquired from training to their actual job (Wexley & Latham, 1991). According to Baldwin and Ford (1988) transfer of training involves the generalization of trained skills and behaviors from the training environment to the work environment, and the maintenance of those trained skills and behaviors on the job. Brethower and Smalley (1998) pointed out that the most important aspect of training is to insure that what people learn is actually used on the job. Bruce (1999) also asserted that it is very important that training programs

include an evaluation of the extent to which competent employees are produced and, additionally, produced in an acceptable amount of training time.

As recently as 2001, Fitzpatrick reported that only 10% of what is learned in training is actually applied on the job. This means that training is failing to affect organizational performance because individuals are not able to change their behavior and improve their performance on the job (Kozlowski et al., 2000). Transfer of training clearly poses a serious problem for organizations (Baldwin & Ford, 1988; Burke, 2001). This is unfortunate because training is one of the most, if not the most, pervasive methods used for improving the job performance of current employees and communicating organizational goals to new employees (Arthur, Bennett, Edens, & Bell, 2003).

Transfer of training is directly affected by learning and retention (Baldwin & Ford, 1988; Binder & Bloom, 1989). That is, in order for trained skills and knowledge to transfer, the training material must be mastered and retained. Binder and Bloom have pointed out that the typical training procedures (e.g., reference manuals, lectures, demonstrations, training films, etc.) do not require mastery, and thus employees are required to perform the skills on the job before they are ready, leading to employee frustration and transfer failure. Therefore, it is important for training professionals to use methods that improve mastery and retention of trained skills and in doing so, improve transfer of training.

Behavioral Fluency and Precision Teaching

One type of training approach that has recently been used in organizations and

enables employees to perform efficiently and effectively in their natural environment is behavioral fluency (Binder, 1993, 1996). Behavioral fluency is often defined as the combination of accuracy plus speed in responding that is characteristic of expert performance (Binder, 1988, 1996). It has evolved from the basic research on free-operant conditioning and precision teaching methodology insofar as fluency researchers, trainers, and precision teachers have focused on rate of responding rather than percentage correct (Binder, 1996; Lindsley, 1990).

Precision teaching was developed by Ogden Lindsley in the 1960s (Binder, 1996; Lindsley, 1990; Potts, Eshleman, & Cooper, 1993). It consists of a set of methods and procedures that promote the systematic evaluation of instruction (West & Young, 1992; White, 1986). In other words, precision teaching is a tool for making data-based decisions regarding the effectiveness of a teaching program. Precision teaching adheres to a “student knows best” approach, which is an approach that allows instructors to make changes in teaching strategies based on the performance of the individual learner.

The most widely cited study demonstrating the effectiveness of precision teaching was conducted in the Sacajawea Elementary School in the 1970s (Binder & Watkins, 1990). Students and teachers engaged in 20 to 30 minutes per day of precision teaching with a curriculum that was similar to other schools in the district. After four years, students who were taught with precision teaching averaged 19 to 40 percentile points higher on standardized tests than other students in the district (Binder & Watkins).

Student achievement at the Morningside Academy in Seattle, Washington, illustrates another major success of precision teaching (Binder, 1993; Johnson & Layng, 1992). In the 1980s, Kent Johnson began the Academy as a tutoring center, blending direct instruction and precision teaching (Engelmann & Carnine, 1982). Morningside Academy is now a full-time school that has produced unprecedented gains in learning with children. For example, children diagnosed as learning disabled, who have not gained more than half a year in any one year in the public schools, usually gain an average of two to three grade levels per year as measured by standardized tests (Johnson & Layng).

In the summer of 1991, a pilot project based on the Morningside model was begun at Malcolm X College (Johnson & Layng, 1992). Thirty-three students participated in a pilot mathematics program for six weeks. The students were broken into two fraction groups, two whole number groups, and an advanced group. After 33 hours of instruction, the two fraction groups, who were previously performing at a 5th grade math level, gained 2 years in mathematical problem solving and concepts and 6 years in computation. The two whole number groups, who were previously performing at the 4th grade level, gained 0.9 years in mathematical problem solving, 0.6 years in mathematical concepts, and 1 year in computation. The advanced group, who was previously performing at the 10th grade level, gained 3 years in mathematical problem solving, 2.2 years in concepts, and 1.9 years in computation. The results of the pilot helped to establish the Precollege Institute in the fall of 1991. The purpose of the Institute was to help students improve their reading and math skills so they

would be eligible for admission. Students at the Institute regularly gained an average of 2 grade levels for every 20 hours of instruction (Johnson & Layng).

Precision teaching has now been shown to be an effective tool for making data-based program decisions for a wide variety of educational populations (e.g., college students, at-risk youth, persons with developmental disabilities, and persons with traumatic brain injuries) across a wide range of settings (Binder, 1996; Haughton, 1997; Kubina & Morrison, 2000; Kubina, Ward, & Mozzoni, 2000; Merbitz, Miller, & Hansen, 2000; White, 1986). The advantage of adding precision teaching to a curriculum originates from two of its key features. The first is a responsive measurement system that includes daily, direct, and continuous measures of a particular curriculum skill. The second is its unique emphasis on fluency-building.

Fluency

The ability to perform quickly, accurately, and without hesitation is a distinguishing characteristic of fluent performance. Many terms, such as "automatic," "second nature" and "effortless" have been equated with fluent performance. Fluency represents a standard of true mastery (Binder & Bloom, 1989) and is a way to distinguish between a novice and an expert. Trainee learning is typically assessed using an accuracy criterion, usually percent correct. The use of an accuracy only measure is limiting in that no further measurement of performance is possible once the 100% criterion is reached (Binder, 1996). For example, if two students who take a math test both score 100%, but one completes the test in 20 minutes and the other in

60 minutes, the former may be considered to be more proficient. A fluency measure adds a level of sensitivity by breaking through the ceilings imposed by the 100% correct maximum. According to Binder and Bloom, in order for employees to truly master training material, they must have ample opportunities for practice, a component that is unfortunately lacking in most training programs. When trainers and organizations fail to include a time measurement for performance, they often limit their training program's ability to effectively improve learning and performance. In fact, most conventional training programs actually prevent fluent performance (Binder & Bloom).

Unfortunately, the empirical literature on fluency for employee training is extremely limited. In 1989, Binder and Bloom used a fluency-based training program to teach product knowledge to commercial bankers at two banks. In order to build fluency, they used brief timed practice of activities to acquire facts, verbal recall exercises, and role-playing. Employees at both banks increased their accuracy and speed of responding. Before fluency-building, salespersons responded to customers' needs and concerns in 8 to 9.5 seconds. After fluency-building, salespersons responded in about 3.5 to 4 seconds.

Binder and Sweeney (2002) used fluency-building to help improve the sales and service of customer service representatives in a large wireless phone company. During a two week workshop the on-the-job performance of new employees tripled each week, and all participants met the fluency training goals. In addition, the new employees met the call center benchmark within a few days and then averaged 60%

higher than the benchmark within a few weeks, while those trained without fluency-building did not improve their performance. Although these studies suggest that fluency-building can produce large benefits, both were case studies, lacking experimental control.

Pampino, Wilder, and Binder (2005) used a multiple baseline design across participants to investigate the effectiveness of fluency-building for four foremen in a construction company. Prior to the intervention, the authors conducted an assessment to determine why the foremen were making errors when reporting job codes. They discovered two problems: foremen could not remember the correct codes for jobs and were making typing errors when entering codes into a spreadsheet. The authors then used fluency-building procedures to teach the foremen the correct codes and to correctly enter the codes into a spreadsheet. After fluency-building, all four improved their performance appreciably. Additionally, the training was very efficient, lasting an average of only 2 hours over 12-18 twenty-minute sessions.

Although only a few fluency studies have been conducted with employees in business settings, fluency-building has been shown to improve a variety of skills with different populations. These include elementary school children (Chiesa & Robertson, 2000; Cooper, 2000; Miller, Hall, & Heward, 1995; Shirley & Pennypacker, 1994; Van Houten, Morrison, Jarvis, & McDonald, 1974; Weinstein & Cooke, 1992), children with developmental disabilities, attention deficit disorder, and traumatic brain injury (Binder, Haughton, & VanEyck, 1995; Chapman, Ewing, & Mozzoni, 2005; Young, West, Howard, & Whitney, 1986), deaf children with learning

disabilities (Young, West, & Crawford, 1985), and college students (Bucklin, Dickinson, & Brethower, 2000; Kim, Carr, & Templeton, 2001; Olander, Collins, McArthur, Watts, & McDade, 1986).

It should be noted that some have questioned whether the increases in performance from fluency building were actually due to increases in the rate of correct responding, or whether they were due to increased practice and/or reinforcement rates (see Doughty, Chase, & O'Shields, 2004 for a discussion). As Doughty et al. pointed out, few studies have controlled for practice effects and rate of reinforcement. Those that have yielded inconsistent results (Evans & Evans, 1985; Evans, Mercer, & Evans, 1983; Shirley & Pennypacker, 1994). Although this issue has yet to be settled, a recent study by Porritt (2007) suggests that increases in performance may well be due to fluency-building and not practice or rate of reinforcement.

Outcomes Associated with Fluency

There are three learning outcomes associated with fluent or automatic performance: retention, endurance, and application (Binder, 1993, 1996). It seems reasonable that when individuals can perform skills fluently (i.e., accurately and without hesitation), they will retain those skills over longer periods of time, be able to perform them better in distracting situations, and be able to apply them more readily when learning new and more complex skills and knowledge (Binder, 1990). Johnson and Layng (1996) captured these benefits of fluency in the acronym RESAA (retention, endurance, stability, application, and adduction). The term retention refers

to the persistence of a high rate of accurate performance after a time has passed without the target response occurring. Endurance is the ability to perform the target skill over long durations despite fatigue. Stability is the perseverance of high response rates even when distractions are present. Application refers to generalization, or the occurrence of a trained skill under new stimulus conditions. Lastly, adduction is the acquisition of a new skill when its component skills have been trained to mastery. The RESAA acronym has generated a long-term research agenda to investigate these critical learning outcomes. The current study, however, will investigate only one of these outcomes, retention effects, so the subsequent literature review will focus only on the topic of retention.

Retention

A number of fluency studies have examined retention (Ashbaugh & McLaughlin, 1997; Berquam, 1981; Bucklin et al., 2000; Bullara, Kimball, & Cooper, 1993; Ivarie, 1986; McDowell & Keenan, 2001; Olander et al., 1986; Shirley & Pennypacker, 1994; Young et al., 1985). Most of these studies, however, have examined retention effects for young or at-risk young learners. For example, Ivarie (1986) investigated the effects of fluency-building on the retention of fourth grade students. The students translated Arabic numerals into Roman numerals to different levels of fluency. They were classified into three groups based on their math skills (average, above-average, and below-average) and then half of the students from each group were assigned to either a 35-correct responses per minute fluency-building group or a 70-correct responses per minute fluency-building group. The retention

rates for speed plus accuracy of performance were considerably higher for the below-average and average students who were in the higher fluency-building group, but the retention rates for the above-average students were similar regardless of fluency-building group. When accuracy was examined alone however, only the below-average students benefited from the higher fluency-building criterion.

Only two studies have examined the effects of fluency-building on the retention of adult learners, which is a more appropriate target population when attempting to generalize results to employees. Olander et al. (1986) taught college students concepts in pathophysiology using either fluency-building methods or traditional methods. After an eight month retention period the fluency-building group had greater accuracy and speed than the traditionally taught students. While these results are interesting, some methodological issues prevent a firm conclusion that fluency-building was responsible for the improved retention.

Bucklin et al. (2000) investigated the effects of fluency-building on both retention and application. Thirty undergraduate students were randomly assigned to an accuracy group or a fluency-building group. The students learned relations between Hebrew symbols and nonsense syllables, and between Arabic numerals and nonsense syllables. The accuracy group was required to achieve the 100% correct criterion with no time requirement, while the fluency-building group was required achieve the 100% criterion with a time requirement. The results showed that the students in the fluency-building group retained significantly more when tested 16 weeks later. They also performed significantly better on an application task

immediately after training and 16 weeks later. While the results of this study strongly suggest that fluency-building improves retention, the number of practice trials was not controlled; thus, the improved retention may have been due to either rate-building or more practice.

Overlearning and Automaticity

Overlearning and automaticity are similar to the concept of fluency, and both have been studied and reported in different literatures. Overlearning is a term used to refer to procedures that provide learning trials beyond the point at which learners achieve 100% accuracy and has been examined by traditional verbal learning and perceptual-motor learning researchers (Binder, 1996; Johnson & Layng, 1992). The obvious problem with these repeated trial procedures is that it is impossible to directly assess the effects of overlearning beyond the point of 100% accuracy with an accuracy only measure. In order to correct for this problem, researchers look at secondary effects, such as transfer of training and retention rates, as indicators of learning beyond the 100% correct criterion (Binder). Early studies have shown that retention is one of the key benefits of overlearning (Driskell, Willis, & Cooper, 1992). For example, Krueger (1930) had participants perform a maze tracing task until they reached a 100% accuracy criterion and then had them perform additional trials to a 50% overlearning criterion, a 100% overlearning criterion, or a 200% overlearning criterion. Retention tests were then given to participants at set intervals after training. Participants had greater retention with the greater degree of overlearning.

A more recent study conducted by Schendel and Hagman (1982) also

examined the effects of overlearning on retention. Participants were first required to reach the 100% accuracy criterion on a military procedural task, which consisted of one errorless assembly and disassembly of an M60 machine gun. They were then required to complete overlearning trials, which were determined by the number of trials it took the participants to meet the accuracy criterion. For example, if a participant took 10 trials to achieve the accuracy criterion, 100% overlearning consisted of 10 more trials. The group of participants who engaged in overlearning made 65% fewer errors than a control group when retested eight weeks later.

Driskell et al. (1992) conducted a meta-analysis to assess the effects of overlearning on retention. Consistent with the results of the studies discussed above, the results suggest that overlearning is an effective method for improving retention for both physical and cognitive tasks; however the effects were found to be more robust for cognitive tasks. The results also suggest that the greater the overlearning the greater the retention, with the caveat that the effects decrease as the length of the retention interval increases.

As with fluency, the major findings in the automaticity literature focus on the learning outcomes associated with automatic performance. Automaticity refers to performance that is fast, automatic, and does not require the performer's attention. The performance of some tasks can become automatic with extensive practice (Cohen, Dunbar, & McClelland, 1990; Logan, 1985), and when a skill is trained to some level of automaticity, it can become faster, more accurate, more resistant to distraction, and retained better (Holt & Rainey, 2002). Thus, the stated benefits are

the same as the stated benefits of fluency.

Several studies have shown that when a skill reaches a level of automaticity greater retention results (Fisk & Hodge 1992; Fisk, Hodge, Lee & Rogers, 1990; Healy, Fendrich, & Proctor, 1990; Naslund, 1987). For example, Healy et al. investigated the effects of automaticity on retention using a letter detection task. Participants were given strings of 16 letters and asked to find a specific target letter (e.g., H). The thirty-six students were assigned to one of three groups: (1) extensive detection training, (2) limited detection training, and (3) no training. At the end of training, participants in the extensive training group had greater accuracy and shorter latencies than participants in the other two groups, indicating that only these participants had achieved automaticity. When given retention tests three to five weeks later, the extensive training group continued to perform more accurately and quickly than the other two groups, who performed comparably. These results are similar to the results of studies that have examined the effects of overlearning and fluency on retention.

It appears that the overlearning and automaticity literature provides support for the relationship between fluency and retention. In fact, some have suggested that overlearning, automaticity, and fluency may refer to the same behavioral phenomenon (Dougherty & Johnston, 1996). However, the concept of fluency stresses the importance of rate of response, whereas the concepts of overlearning and automaticity stress practice beyond accuracy. Nonetheless, as indicated earlier, some have argued that the benefits of fluency may be due to repeated practice and/or higher rates of

reinforcement, rather than the rate measure per se (Doughty et al., 2004). If that is the case, overlearning, automaticity, and fluency-building would be expected to have the same effects on retention.

Purpose of the Current Study

Fluency-building is a type of training that has been typically used, or at least typically documented, in educational settings. Results from both case studies and experimental studies, however, suggest that fluency-building can benefit adult learners in general (Bucklin et al., 2000; Johnson & Layng, 1992; Kim et al., 2001) and employees in particular (Binder & Bloom, 1989; Binder & Sweeney, 2002; Pampino et al., 2005).

The purpose of the current study was to assess whether a fluency-building training program would improve the acquisition and retention of automotive product knowledge in comparison to a more traditional training program with and without the use of study objectives. The traditional program with study objective condition was included as a control condition. The fluency-building training program identified the specific questions that were asked on a post-training knowledge test while the traditional program did not. The study objectives, which also identified the specific questions on the post-test, thus controlled for the fact that the questions were identified in the fluency-building training program.

Both the traditional training program and the fluency-building training programs were web-based. In the traditional program, product knowledge was presented on instructional screens with textual narration. In the fluency-building

program, product knowledge was presented textually, using simulated flashcards. Trainees were given a fluency goal and self-evaluated their accuracy and fluency during training.

The training programs were created by a consulting firm that is responsible for training sales representatives around the world. The traditional program represents the standard training format for programs developed by the instructional design firm. Thus, in addition to contributing to the scientific literature on fluency, this study served as a data-based program evaluation for the consulting firm.

The effects of the three training conditions (fluency-building, traditional, and traditional with study objectives) were assessed by how accurately and quickly participants responded on a product knowledge test immediately after training, four weeks after training, and eight weeks after training. It should be noted that, similar to most other studies of fluency-building, practice was not controlled. Rather, practice was free to vary as it would if these two training programs were implemented with actual sales representatives. While this decreased the experimental rigor of the study, it increased its realism.

METHOD

Participants and Setting

Participants were 60 male and female undergraduate students enrolled at Western Michigan University. They were recruited by in-class announcements (see Appendix A for the recruitment script) and flyers posted in university buildings (see Appendix B for the recruitment flyer). Participants were excluded if they previously worked in or were currently working in the automotive industry because their knowledge about vehicle safety features could have affected how they performed. Participants were paid for their participation as described in the *Pay Procedures* section. In addition, 59 of the participants also received extra credit because they were recruited from classes in which extra credit for participation in the study was offered by the professor. All potential participants met the aforementioned criterion and completed the study; that is, no participants withdrew before completion.

The experimental setting consisted of one of three small rooms and the Performance Management Laboratory (PM Lab) across the hall. The three rooms were located in 2510, 2512, and 2514 Wood Hall, and the PM Lab was located in 2532 Wood Hall. Each of the small rooms contained a table, adjustable chair, computer, keyboard, mouse, and gel palm rest. The PM Lab across the hall was used for the introductory session and as a waiting area for participants before they began their experimental sessions.

Apparatus and Materials

Typing Test

Participants took a typing test during the introductory session. Typing skill might have influenced how fast participants completed the computerized product knowledge test, which could have affected one of the primary measures, fluency (speed plus accuracy of responding). The number of correctly typed words per minute was used as a covariate in the statistical analysis of the results. Appendix C contains the document that the participants typed.

Training Programs

Participants completed one of two web-based safety product knowledge training programs: a traditional (non-fluency-building) program or a fluency-building program. Both covered the same content. The traditional program consisted of several informational screens displayed on a computer. After reading each screen participants clicked on a button that had a forward arrowhead on it to advance to the next screen (see Appendix D for a screen shot of one of the instructional screens). The program allowed participants to repeat instructional screens by clicking on a button that had a backward arrowhead on it.

The fluency-building program simulated flashcards. There were two side-by-side “cards” on the screen. The question was written on the left card, which represented the front of the flashcard. Participants were asked to think of the answer and then click on the right card, which represented the back of the flashcard. When the participants clicked on the right card, the answer appeared on the card.

Participants then self-evaluated their answer by clicking the “Got it right” or “Got it wrong” button below the answer card. When participants clicked the left card, the question card, the next flashcard was presented. When participants felt they learned the material, they clicked a button labeled “Take the challenge.” They then completed each flashcard again as a self-test. As they completed the flashcards, a thermometer-like gauge to the right of the flashcards indicated how many flashcards the participants were getting right (according to their own self-evaluation) and how long it took them to answer the cards (see Appendix E for a screen shot of the program). Participants were able to repeat the flashcards and the “challenge” as many times as they wanted during the training session as long as they kept within the one and a half hour time limit.

Product Knowledge Test

After completing the training, participants took an end-of-training knowledge test (Appendix F) that was displayed on the computer. Participants typed their answers into the Microsoft Word document. Participants took the test again during the two retention test sessions. The questions were the same questions on all three tests; however, the order of the questions was randomly determined on each.

Dependent Variables

The main dependent variables were (a) accuracy, measured by percentage correct, which was calculated by dividing the number of correct responses by the total number of questions attempted, and (b) fluency, which was measured by the number of correct responses per minute on the product knowledge test. Accuracy was

measured by the percentage of attempted questions that were answered correctly rather than by the percentage of total questions on the test that participants answered correctly. This was because the latter measure would have been a redundant fluency measure. That is, given that the test was timed (participants were given 5 minutes to complete the test), the percentage of total items answered correctly would have been perfectly correlated with the number of questions answered correctly per minute. Thus, the accuracy measure was calculated as the percentage of questions that participants answered correctly given the number they answered, which is independent of the time taken to complete them.

Accuracy and fluency were recorded for the post-training test and the two retention tests, which were administered four and eight weeks after training. Participants were given five minutes to complete the test at the end of training and during the two retention test sessions. Upon completion, the participant's test answers were printed and the experimenter scored the test for the percentage correct and the number of correct responses per minute. Thirty percent of the post-training tests and retention tests were rescored by a second researcher to calculate interobserver agreement (dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100). Interobserver agreement was 100%.

Training completion time was recorded as a secondary dependent variable. Due to the technical difficulty of recording the training completion time, it was estimated. If participants completed the training before the one and one-half hour

training session was over, they were asked to go to the PM Lab and tell the experimenter that they had finished. The experimenter recorded the time as the “training completion time.” If the experimenter ended the session after one and one-half hours, the completion time was recorded as an hour and a half. Data were recorded on a data sheet identified by the participant’s number (see Appendix G).

Mean ratings for four post-training questionnaire items also served as secondary dependent variables. Participants were asked to complete a post-training questionnaire after they took the post-test at the end of the training session. There was a different questionnaire for each group, but four of the questions were the same: (a) Please rate how well you think the training program helped you prepare for the product knowledge test; (b) Please rate how well you liked the training program; (c) Please rate the extent to which you found the training program to be fun and engaging; and (d) Please rate the extent to which you would like to have this type of training program for an actual job. For each of these questions, participants indicated their responses on a five-point Likert-type rating scale. Mean ratings for each group were calculated for each question.

Independent Variable

The independent variable was the type of training program: (a) traditional; (b) traditional with study objectives; and (c) fluency-building.

In the traditional program condition, participants completed the traditional training program described previously. The instructional script that was read to participants before they began the training session is provided in Appendix H.

In the traditional program with study objectives condition, participants completed the same training program as above, but were also given a set of study objectives to use (Appendix I). These study objectives identified the specific material that was asked on the product knowledge test, controlling for the fact that the flashcards in the fluency-building training condition also identified the test material. The participants were allowed to write on the study objectives and were told that they could use them as much as they would like to help prepare for the test; however they were not allowed to use the study objectives during the test. The instructional script that was read to participants before they began the training session is provided in Appendix J.

In the fluency-building training program condition, participants completed the fluency-building program that was described earlier. The instructional script that was read to participants before they began the training session is provided in Appendix K.

Pay Procedures

All participants were paid \$5.00 for completing the training program and up to \$10.00 for completing the end-of-training test, based on the percentage correct. For example, if participants scored 100% on the test, they received \$10.00 and if they scored 80%, they received \$8.00. The percentage correct contingency was designed to motivate participants to learn the material in order to do well on the test. Participants received \$5.00 for completing each of the two retention test sessions. A percentage correct criterion was not used to determine the pay during these retention test sessions because participants were expected to do more poorly on the retention

tests due to the passage of time. Participants were paid in cash after they completed their last session.

Experimental Design and Data Analysis

A randomized group design was used. Participants were randomly assigned to one of the three training groups, with each group containing 20 participants.

One-factor analyses of covariance (ANCOVA) were used to assess whether accuracy and fluency differed across the three groups (a) immediately after training, (b) four weeks after training, and (c) eight weeks after training, with typing speed as the covariate. To determine the accuracy of the scored typing tests, 30% of the tests were rescored by a second researcher and interobserver agreement was calculated (dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100). Interobserver agreement was 100%.

One-factor analyses of variance (ANOVA) were used to assess (a) whether training completion time differed across the three groups, and (b) whether participant responses to the four items on the post-training questionnaire differed across the three groups. In addition, monotone alternative analyses (Huitema, 2008) were used to determine whether there was a monotonic increasing relationship between the three training conditions and (a) accuracy and fluency immediately after training, (b) accuracy and fluency four weeks after training, (c) accuracy and fluency eight weeks after training, (d) training completion time, and (e) responses to the four questionnaire items.

Experimental Procedures

Random Assignment

Participants were randomly assigned to one of the three training groups and were tentatively assigned a participant number before the introductory session. The random assignment procedure described by Shadish, Cook, and Campbell (2002) was used. All potential participants signed the consent form and met the eligibility criterion; thus, all retained the participant number that had been tentatively assigned to them.

Introductory Session

During the introductory session the researcher described the study and gave the consent document to the participants. After signing the consent form, participants took the typing test. The instructional script for the typing test is provided in Appendix L.

Training and End-of-Training Test Session

Participants attended a two-hour session. They completed the training program in a room by themselves. They were given an hour and a half to complete the relevant training program, at which point the researcher ended the training. All participants completed the training program within this time period. Participants were instructed to let the researcher know if they finished the training program early. The researcher then read the test instructions to the participants (see Appendix M) and left the room. After five minutes, the researcher entered the experimental room and ended the test. Following the test, the participants were asked to complete a post-training

questionnaire (see Appendix N for the post-training questionnaires).

Retention Test Sessions

Participants attended two thirty-minute retention test sessions, one four weeks after training and one eight weeks after training. The researcher re-administered the product knowledge test. The researcher left the experimental room while participants took the test and after five minutes, entered the room and ended it.

Debriefing

Immediately after participants completed their last retention test session, the researcher asked them to complete a short post-study questionnaire (Appendix O) to obtain information such as (a) the participants' perception of the purpose of the study, and (b) the participants' awareness of the experimental procedures. After participants completed the questionnaire, the researcher debriefed them regarding the purpose of the study (see Appendix P for debriefing script), asked whether they had any questions, and then paid them in cash for their participation.

Integrity of the Independent Variable

Procedures were in place to help ensure that the experimental procedures were administered as described earlier. Scripts were used for all instructions that were given to the participants. Also, job aids (i.e., checklists) were employed during the introductory, training, and retention sessions to ensure that the procedures were implemented properly. In addition, an analysis of study objective completion was conducted in order to determine if there really was a difference between the two groups who viewed the traditional training program and to assess the extent to which

the participants actually used the study objectives. One-hundred percent ($n = 20$) of participants in the traditional training with study objectives group used the study objectives to some degree during training. Seventy percent ($n = 14$) completed 100% of the items, 20% ($n = 4$) completed 90%-99% of the items, and 10% ($n = 2$) completed 65%-89% of the items.

HSIRB Approval

The study was not conducted until it was approved by Western Michigan University's Human Subjects Institutional Review Board (HSIRB). A copy of the HSIRB approval letter is included in Appendix Q.

RESULTS

End-of-Training Accuracy and Fluency

One-factor ANCOVAs were conducted to determine whether post-training accuracy and fluency differed among the three training groups. Table 1 displays the raw means and standard deviations for the percentage correct on the product knowledge test for the three training groups. Also displayed are the adjusted means based on the ANCOVA analysis, using typing speed as the covariate.

Table 1

Post-Training: Raw Data and Adjusted Means for Percentage Correct

Training Condition	<i>M</i>	<i>SD</i>	<i>Adj. M</i>
Traditional	13.9%	11.4%	14.0%
Traditional with Study Objectives	46.2%	18.3%	46.1%
Fluency	60.0%	22.1%	60.0%

Table 2 shows the source table for the results of the ANCOVA. The obtained difference in accuracy was statistically significant, $F(2, 56) = 34.39, p < 0.001$.

Table 2

Post Training: Analysis of Covariance for Percentage Correct

Source	df	SS	MS	F	<i>p</i>
Covariate	1	0.00700	0.00700	0.22	0.642
Training Condition	2	2.20957	1.10479	34.39	0.001
Error	56	1.79908	0.03213		
Total	59	4.05010			

It was predicted that there would be an increase in the mean accuracy scores with the rank ordering of the training conditions. In other words, the traditional training condition was predicted to yield the lowest mean accuracy score and the fluency training condition was predicted to yield the highest mean accuracy score. The results of the monotone alternative analysis showed that there was a monotonic increasing relationship between the training conditions and accuracy as predicted, $t(56) = 8.11, p < 0.001$.

Table 3 displays the raw means and standard deviations for the number of correct answers per minute (fluency) on the product knowledge test for the three training groups. Also displayed are the adjusted means based on the ANCOVA analysis, using typing speed as the covariate.

Table 3

Post-Training: Raw Data and Adjusted Means for Number of Correct Answers per Minute

Training Condition	<i>M</i>	<i>SD</i>	<i>Adj. M</i>
Traditional	0.41	0.38	0.42
Traditional with Study Objectives	2.15	1.07	2.15
Fluency	3.33	1.35	3.33

Table 4 shows the source table for the results of the ANCOVA. The obtained difference in fluency was statistically significant, $F(2, 56) = 40.22, p < 0.001$.

Table 4

Post-Training: Analysis of Covariance for Number of Correct Answers per Minute

Source	df	SS	MS	F	<i>p</i>
Covariate	1	0.191	0.191	0.18	0.672
Training Condition	2	85.173	42.586	40.22	0.001
Error	56	59.299	1.059		
Total	59	145.799			

As with accuracy, it was predicted that there would be an increase in the mean fluency scores with the rank ordering of the training conditions, with the traditional training condition yielding the lowest mean fluency score and the fluency training condition yielding the highest mean fluency score. The results of the monotone

alternative analysis showed that there was a monotonic increasing relationship between the training conditions and fluency as predicted, $t(56) = 8.95, p < 0.001$.

First Retention Test

One-factor ANCOVAs were conducted to determine whether accuracy and fluency differed among the three training groups four weeks after training. Table 5 displays the raw means and standard deviations for the percentage correct (accuracy) obtained on the product knowledge test for the three training groups. Also displayed are the adjusted means based on the ANCOVA analysis, using typing speed as the covariate.

Table 5

First Retention Test: Raw Data and Adjusted Means for Percentage Correct

Training Condition	<i>M</i>	<i>SD</i>	<i>Adj. M</i>
Traditional	8.3%	6.5%	8.2%
Traditional with Study Objectives	22.4%	9.8%	22.4%
Fluency	23.0%	13.8%	23.0%

Table 6 shows the source table for the results of the ANCOVA. The obtained difference in accuracy retention was statistically significant, $F(2, 56) = 12.24, p < 0.001$.

Table 6

First Retention Test: Analysis of Covariance for Percentage Correct

Source	df	SS	MS	F	<i>p</i>
Covariate	1	0.00185	0.00185	0.17	0.684
Training Condition	2	0.27054	0.13527	12.24	0.001
Error	56	0.61906	0.01105		
Total	59	0.88960			

It was predicted that there would be an increase in the mean accuracy retention scores with the rank ordering of the training conditions. In other words, the traditional training condition was predicted to yield the lowest mean accuracy retention score and the fluency training condition was predicted to yield the highest mean accuracy retention score. The results of the monotone alternative analysis showed that there was a monotonic increasing relationship between the training conditions and accuracy retention as predicted, $t(56) = 4.32, p < 0.001$.

Table 7 displays the raw means and standard deviations for the number of correct responses per minute (fluency) obtained on the product knowledge test for the three training groups. Also displayed are the adjusted means based on the ANCOVA analysis, using typing speed as the covariate.

Table 7

First Retention Test: Raw Data and Adjusted Means for Number of Correct Answers per Minute

Training Condition	<i>M</i>	<i>SD</i>	<i>Adj. M</i>
Traditional	0.38	0.31	0.38
Traditional with Study Objectives	1.09	0.59	1.10
Fluency	1.23	0.82	1.23

Table 8 shows the source table for the results of the ANCOVA. The obtained difference in fluency retention was statistically significant, $F(2, 56) = 10.08, p < 0.001$.

Table 8

First Retention Test: Analysis of Covariance for Number of Correct Answers per Minute

Source	df	SS	MS	F	<i>p</i>
Covariate	1	0.0882	0.0882	0.24	0.630
Training Condition	2	8.1113	4.0557	10.81	0.001
Error	56	21.0038	0.3751		
Total	59	29.4000			

As with accuracy, it was predicted that there would be an increase in the mean fluency retention scores with the rank ordering of the training conditions, with the traditional training condition yielding the lowest mean fluency retention score and the

fluency training condition yielding the highest mean fluency retention score. The results of the monotone alternative analysis showed that there was a monotonic increasing relationship between the training conditions and fluency retention as predicted, $t(56) = 4.35, p < 0.001$.

Second Retention Test

One-factor ANCOVAs were conducted to determine whether accuracy and fluency differed among the three training groups eight weeks after training. Table 9 displays the raw means and standard deviations for the percentage correct (accuracy) obtained on the product knowledge test for the three training groups. Also displayed are the adjusted means based on the ANCOVA analysis, using typing speed as the covariate.

Table 9

Second Retention Test: Raw Data and Adjusted Means for Percentage Correct

Training Condition	<i>M</i>	<i>SD</i>	<i>Adj. M</i>
Traditional	7.2%	6.2%	7.1%
Traditional with Study Objectives	19.5%	10.9%	19.5%
Fluency	20.5%	13.4%	20.5%

Table 10 shows the source table for the results of the ANCOVA. The obtained difference in accuracy retention was statistically significant, $F(2, 56) = 9.80, p < 0.001$.

Table 10

Second Retention Test: Analysis of Covariance for Percentage Correct

Source	df	SS	MS	F	<i>p</i>
Covariate	1	0.00568	0.00568	0.50	0.480
Training Condition	2	0.22234	0.11117	9.80	0.001
Error	56	0.63531	0.01134		
Total	59	0.85897			

It was predicted that there would be an increase in the mean accuracy retention scores with the rank ordering of the training conditions. In other words, the traditional training condition was predicted to yield the lowest mean accuracy retention score and the fluency training condition was predicted to yield the highest mean accuracy retention score. The results of the monotone alternative analysis showed that there was a monotonic increasing relationship between the training conditions and accuracy retention as predicted, $t(56) = 3.99, p < 0.001$.

Table 11 displays the raw means and standard deviations for the number of correct responses per minute (fluency) obtained on the product knowledge test for the three training groups. Also displayed are the adjusted means based on the ANCOVA analysis, using typing speed as the covariate.

Table 11

Second Retention Test: Raw Data and Adjusted Means for Number of Correct Answers per Minute

Training Condition	<i>M</i>	<i>SD</i>	<i>Adj. M</i>
Traditional	0.34	0.33	0.34
Traditional with Study Objectives	1.04	0.59	1.04
Fluency	1.11	0.79	1.11

Table 12 shows the source table for the results of the ANCOVA. The obtained difference in fluency retention was statistically significant, $F(2, 56) = 9.77, p < 0.001$.

Table 12

Second Retention Test: Analysis of Covariance for Number of Correct Answers per Minute

Source	df	SS	MS	F	<i>p</i>
Covariate	1	0.0000	0.0000	0.00	0.993
Training Condition	2	7.2044	3.6022	9.77	0.001
Error	56	20.6540	0.3688		
Total	59	27.9060			

As with accuracy, it was predicted that there would be an increase in the mean fluency retention scores with the rank ordering of the training conditions, with the traditional training condition yielding the lowest mean fluency retention score and the fluency training condition yielding the highest mean fluency retention score. The

results of the monotone alternative analysis showed that there was a monotonic increasing relationship between the training conditions and fluency retention as predicted, $t(56) = 4.01, p < 0.001$.

Figure 1 displays the means for the percentage correct for the three training groups immediately after training, four weeks after training, and eight weeks after training.

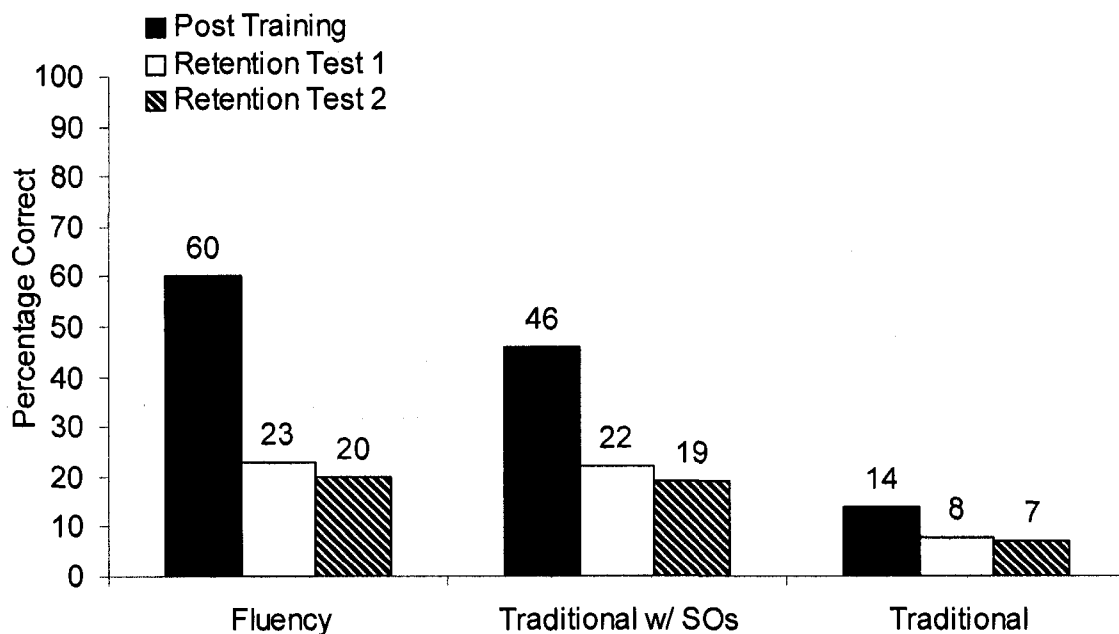


Figure 1. Percentage correct immediately after training, four weeks after training, and eight weeks after training.

Figure 2 displays the means for the number of correct answers per minute for the three training groups immediately after training, four weeks after training, and eight weeks after training.

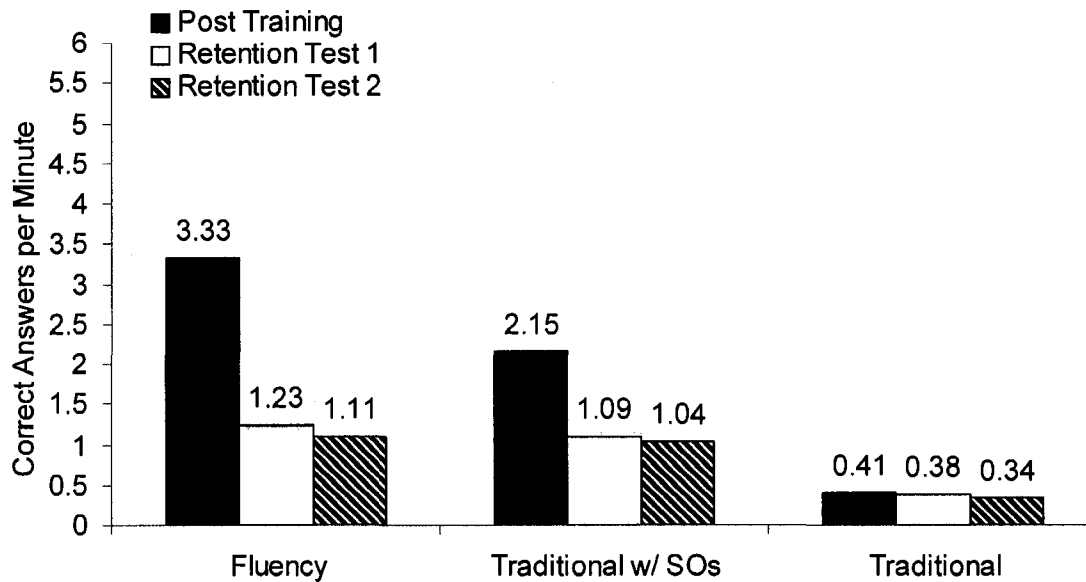


Figure 2. Number of correct answers per minute immediately after training, four weeks after training, and eight weeks after training.

Overall, the retention data indicated that the fluency training group retained the most material and the traditional training group retained the least at four and eight weeks after training. However, it is important to note that the overall accuracy and fluency means for all three groups were quite low immediately following training. The traditional training group performed very poorly immediately after training, averaging only 14% correct on the test. In addition, the traditional training with study objectives group and the fluency training group lost much of the material acquired post-training and performed very similarly at four weeks and eight weeks after training.

Training Completion Time

A one-factor ANOVA was conducted to determine whether training

completion time differed across the three training groups. Table 13 displays the raw means and standard deviations for the training completion time (in minutes) for the three training groups.

Table 13

Raw Data for Training Completion Time

Training Condition	<i>M</i>	<i>SD</i>
Traditional	30.18	19.82
Traditional with Study Objectives	49.78	16.10
Fluency	59.92	20.66

Table 14 shows the source table for the results of the ANOVA. The obtained difference in training completion time was statistically significant, $F(2, 57) = 12.72, p < 0.001$.

Table 14

Analysis of Variance for Training Completion Time

Source	df	SS	MS	F	<i>p</i>
Training Condition	2	9144	4572	12.72	0.001
Error	57	20490	359		
Total	59	29634			

It was predicted that there would be an increase in the mean training time completion scores with the rank ordering of the training conditions. In other words,

the traditional training condition was predicted to yield the lowest mean training completion time score and the fluency training condition was predicted to yield the highest mean training completion time score. This prediction was made because the traditional training program consisted of only eight instructional frames and participants in the traditional training condition were not expected to spend as much time studying or practicing the content as participants in the other two groups, who knew what questions would be on the test. The results of the monotone alternative analysis showed that there was a monotonic increasing relationship between the training conditions and training completion time as predicted, $t(57) = 4.96, p < 0.001$.

Post-Training Questionnaire Items

As indicated earlier, there were four questions that were the same for all training conditions. One-factor ANOVAs were conducted to determine whether participant post-training responses differed on these four questions. The other questions were idiosyncratic to the particular training condition. While the answers to these are informative, they do not permit a quantitative comparison across training conditions (see Appendix R for participant responses on all items).

Figure 3 displays the four questions that were the same for all training conditions.

1. Please rate how well you think the training program helped you prepare for the product knowledge test.				
1 Not at all	2 Very little	3 Somewhat	4 Much	5 A great deal
2. Please rate how well you liked the training program.				
1 Strongly disliked	2 Disliked	3 Neutral	4 Liked	5 Strongly liked
3. Please rate the extent to which you found the training program to be fun and engaging.				
1 Very boring	2 Somewhat boring	3 Neutral	4 Somewhat fun and engaging	5 Very fun and engaging
4. Please rate the extent to which you would like to have this type of training program for an actual job.				
1 Strongly dislike	2 Dislike	3 Neutral	4 Like	5 Strongly like

Figure 3. Comparable post-training questionnaire items.

Table 15 displays the means and standard deviations for the three different training groups.

Table 15

Raw Data for the Comparable Post-Training Questionnaire Items

Training Condition	Q1		Q2		Q3		Q4	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Traditional	2.9	0.72	3.1	0.69	2.7	1.13	2.3	0.98
Traditional with Study Objectives	3.8	0.85	3.6	0.68	3.5	0.76	3.6	0.99
Fluency	3.6	0.99	2.9	1.13	2.8	1.25	2.6	1.19

Table 16 shows the source table for the results of the ANOVA for question one. The obtained difference for question one was statistically significant, $F(2, 57) = 5.54, p = 0.006$.

Table 16

Analysis of Variance for Question One

Source	df	SS	MS	F	<i>p</i>
Training Condition	2	8.233	4.117	5.54	0.006
Error	57	42.350	0.743		
Total	59	50.583			

It was predicted that there would be an increase in the mean rating scores for question one with the rank ordering of the training conditions. In other words, the traditional training condition was predicted to yield the lowest mean rating score and

the fluency training condition was predicted to yield the highest mean rating score. The results of the Spearman based bootstrap approach (McKean, Naranjo, & Huitema, 2001) showed that there was not a monotonic increasing relationship between the training conditions and ratings for question one, *Spearman's rho squared* (58) = .08, $p = 0.07$.

It was predicted that the traditional training group would yield the lowest rating and the fluency training group would yield the highest rating on question one, which assessed the extent to which participants felt the training program helped them prepare for the test. The data indicated that while the traditional training group felt the least prepared, the traditional training with study objectives group felt the most prepared for the product knowledge test.

Table 17 shows the source table for the results of the ANOVA for question two. The obtained difference for question two was statistically significant, $F(2, 57) = 4.07, p = 0.022$.

Table 17
Analysis of Variance for Question Two

Source	df	SS	MS	F	<i>p</i>
Training Condition	2	6.033	3.017	4.07	0.022
Error	57	42.300	0.742		
Total	59	48.333			

As with question one, it was predicted that there would be an increase in the

mean rating scores for question two with the rank ordering of the training conditions, with the traditional training condition yielding the lowest mean rating score and the fluency training condition yielding the highest mean rating score. The results of the Spearman based bootstrap approach (McKean et al., 2001) showed that there was not a monotonic increasing relationship between the training conditions and ratings for question two, *Spearman's rho squared* (58) = .002, $p = 0.63$.

It was predicted that the traditional training group would yield the lowest rating and the fluency training group would yield the highest rating on question two, which assessed the extent to which participants liked the training program. The data however, indicated that the fluency training group liked the program the least and the traditional training with study objectives group liked the program the most.

Table 18 shows the source table for the results of the ANOVA for question three. The obtained difference for question three was statistically significant, $F(2, 57) = 3.53$, $p = 0.036$.

Table 18
Analysis of Variance for Question Three

Source	df	SS	MS	F	<i>p</i>
Training Condition	2	8.03	4.02	3.53	0.036
Error	57	64.95	1.14		
Total	59	72.98			

As with questions one and two, it was predicted that there would be an

increase in the mean rating scores for question three with the rank ordering of the training conditions, with the traditional training condition yielding the lowest mean rating score and the fluency training condition yielding the highest mean rating score. The results of the Spearman based bootstrap approach (McKean et al., 2001) showed that there was not a monotonic increasing relationship between the training conditions and ratings for question three, *Spearman's rho squared* (58) = .000, $p = 0.41$.

It was predicted that the traditional training group would yield the lowest rating and the fluency training group would yield the highest rating on question three, which assessed the extent to which participants found the training program to be fun and engaging. The data indicated that while the traditional training group rated the program to be the least fun and engaging, the traditional training with study objectives group rated the training program to be the most fun and engaging.

Table 19 shows the source table for the results of the ANOVA for question four. The obtained difference for question four was statistically significant, $F(2, 57) = 7.59, p = 0.001$.

Table 19
Analysis of Variance for Question Four

Source	df	SS	MS	F	<i>p</i>
Training Condition	2	17.03	8.52	7.59	0.001
Error	57	63.95	1.12		
Total	59	80.98			

As with the previous questions, it was predicted that there would be an increase in the mean rating scores for question four with the rank ordering of the training conditions, with the traditional training condition yielding the lowest mean rating score and the fluency training condition yielding the highest mean rating score. The results of the Spearman based bootstrap approach (McKean et al., 2001) showed that there was not a monotonic increasing relationship between the training conditions and ratings for question four, *Spearman's rho squared* (58) = .011, $p = 0.20$.

It was predicted that the traditional training group would yield the lowest rating and the fluency training group would yield the highest rating on question four, which assessed the extent to which the participants would like to have this type of training for an actual job. While the participants in the traditional training group indicated they would least like to have this type of training for an actual job, participants in the traditional training with study objectives group indicated they would most like to have this type of training for an actual job.

Overall, the rating data favored the traditional training program with study objectives. The means for all four questions were higher than the mid-point in the rating scale. This was not the case for the other two groups. For the fluency group, the means for three of the questions (questions two, three, and four) fell below the mid-point of the rating scale. The traditional training group fared the worst. The means were the lowest on three of the four questions, and were below the mid-point of the scales.

DISCUSSION

The primary purpose of this study was to determine whether a fluency-building training program would improve the acquisition and retention of automotive product knowledge, in contrast to a more traditional training program with and without study objectives. Participants in the fluency-building training group performed more accurately and fluently on the product knowledge test immediately after training, four weeks after training, and eight weeks after training than participants in the other two groups. Those in the traditional training group (without study objectives) performed least well. However, even the participants in the fluency-building training group did not perform as well as might be necessary to effectively interact with customers on an actual job. Potential reasons for this are discussed below.

Trainee satisfaction ratings favored the traditional training program with study objectives; the traditional training program without study objectives fared the worst. Trainee responses on a post-training questionnaire revealed several minor modifications that could be made to the fluency-building program that might improve trainee reactions. These are also discussed below.

This study extended previous studies because it examined the effects of fluency-building training with adult learners who completed training programs that were designed to train actual sales representatives in the automotive industry. The results are important because fluency-building led to higher levels of performance and retention; however practice was not controlled. The results are also important

because they suggest changes that could be made to the fluency-building program that could enhance both its effectiveness and trainee satisfaction with it.

Post-Training Accuracy and Fluency

The fluency-building training program led to higher levels of accuracy on the product knowledge test immediately after training. The fluency training group averaged 60% correct, while the traditional training group and the traditional training with study objectives group averaged 14% correct and 46% correct, respectively. The fluency-building training program also led to higher rates of correct answers per minute on the product knowledge test immediately after training. The fluency training group averaged 3.33 correct responses per minute, while the traditional training group and the traditional training with study objectives group averaged 0.42 correct responses per minute and 2.15 correct responses per minute, respectively.

The differences between the three groups were statistically significant; however, the percentage correct and the number of correct responses per minute were relatively low for all three groups. In other words, none of the groups were performing highly accurately or fluently post-training.

There are several possible explanations for why the acquisition of the training material was low. One is the difficulty of the material. The material may simply have been too difficult for the participants to acquire higher levels of accuracy and fluency in the amount of training time allotted. On the other hand, 57 of the 60 participants terminated training before the hour and a half ended, saying that they felt prepared to take the exam. Similarly, there may have been too much material for the participants

to acquire higher levels of accuracy and fluency.

In addition, failure to meet the fluency goal may have caused or contributed to the relatively low accuracy and fluency levels for the fluency-building training group. On the post-training questionnaire, participants in that training group were asked whether they tried to meet the fluency goal and, if they did try, the extent to which they met the goal. While 95% ($n = 19$) reported that they tried to meet the goal, only 20% ($n = 4$) reported that they met (15%, $n = 3$) or exceeded the goal (5%, $n = 1$). Forty percent ($n = 8$) reported that they nearly met the goal while another 40% ($n = 8$) reported that they did not meet the goal. Thus, failing to meet the fluency goal may be one reason why the fluency-building training group did not perform more accurately or fluently immediately after training. This assertion is supported by the performance of the four participants who reported meeting or exceeding the fluency goal. These four participants averaged 86% correct and averaged 5 correct responses per minute immediately after training, while the other 16 participants in the fluency-building training group averaged 50.2% correct and averaged 2.9 correct responses per minute immediately after training.

Retention

The fluency-building training program led to higher levels of accuracy retention four and eight weeks after training. The fluency training group averaged 23% correct and 20% correct four and eight weeks after training, respectively; the traditional training with study objectives group averaged 22% correct and 19% correct four and eight weeks after training, respectively; and the traditional training group

averaged 8% correct and 7% correct four and eight weeks after training, respectively. The fluency-building training program also led to higher levels of fluency retention four and eight weeks after training. The fluency training group averaged 1.23 and 1.11 correct responses per minute four and eight weeks after training, respectively; the traditional training with study objectives group averaged 1.09 and 1.04 correct responses per minute four and eight weeks after training, respectively; and the traditional training group averaged 0.38 and 0.34 correct responses per minute four and eight weeks after training, respectively.

The retention differences between the three groups were statistically significant both four and eight weeks after training. However, the differences do not appear to be practically significant. Because accuracy and fluency levels were relatively low across all three groups immediately after training (indicating that the three groups did not acquire very much of the material), it would be expected that the retention levels be low as well.

There are several possible explanations for why the retention of the training material was low. As with acquisition, one possible explanation for these results is the difficulty of the material. The material may simply have been too difficult for the participants. Similarly, there may have been too much material for the participants. In addition, the post-training results and the post-training questionnaire results indicated that none of the groups were performing at levels that could be considered “fluent,” and improved retention is an outcome that is associated only with some degree of fluency (Binder, 1993, 1996). Although the fluency-building program was

designed to build fluency, it was also designed to allow the participants to self-evaluate their accuracy and fluency levels. There was no objective measure of performance, nor were participants required to meet the fluency goal before ending training. As indicated earlier, the post-training questionnaire results suggest that most of the participants did not, in fact, meet the fluency goal. Thus, participants may not have been performing fluently enough to influence retention. This possibility is supported by the results for the traditional training with study objectives group. The traditional training program was not designed to build fluency, and it did not. At the end of training, participants in the traditional training with study objectives group averaged only 2.15 correct responses per minute, yet their retention rates both four and eight weeks after training were similar to the retention rates of participants in the fluency-building training group.

Furthermore, the four participants in the fluency-building training group who reported meeting or exceeding the fluency goal performed more accurately and fluently four and eight weeks after training than the other 16 participants in that group, who reported that they did not meet the fluency goal. The four participants who met or exceeded the fluency goal averaged 40% correct and 32.8% correct four and eight weeks after training, respectively and they averaged 2.2 and 1.9 correct responses per minute four and eight weeks after training, respectively. The other 16 participants averaged 17% correct and 15.7% correct four and eight weeks after training, respectively and they averaged 0.99 and 0.91 correct responses per minute four and eight week after training, respectively.

Post-Training Questionnaire Items

Those in the traditional training with study objectives group rated the training the highest on all four comparative post-questionnaire items: The extent to which they (a) believed the training program prepared them for the test, (b) liked the training program, (c) found the training program to be fun and engaging, and (d) would like to have this type of training for an actual job. Those in the traditional training without study objectives group rated the training the lowest, with the exception of question two, how well they liked the training program. Thus, the trainee satisfaction data favored the traditional training program with study objectives.

The fluency-building training group performed more accurately and fluently on the product knowledge test immediately after training and four and eight weeks after training than those in the other two training groups, but satisfaction with the program was relatively low. This may be one reason why many of the participants reported that they did not meet the fluency goal. That is, they may not have found the program engaging or rewarding enough to sustain the level of practice that was needed to master the material which was ultimately reflected in their relatively low end-of-training accuracy (i.e., 60%) and fluency rates (i.e., 3.33 correct answers per minute). Modifications to the fluency-building training program that might increase its effectiveness and trainee satisfaction with it are discussed in the *Future Research* section.

Trainee satisfaction ratings were, in general, quite low across all three training groups. These ratings could reflect the content of the training program, which was

highly technical, rather than the training program themselves.

Weaknesses of the Study

The main weakness was that, similar to most other studies of fluency-building, practice was not controlled. While the results clearly show that the fluency training group performed the best, the results may be due to the fluency-building or more practice. For example, the fluency group spent an estimated average of 59.92 minutes in training, while the traditional training with study objectives group and the traditional training group spent an estimated average of 49.78 minutes and 30.18 minutes, respectively. These data indicate that the fluency training group had more exposure to the training material.

Similar to other laboratory studies, the participants in this study were college students. The strength of their motivation to learn the material may well have been different than that of actual sales representatives. Most of the participants received course credit for participating and were also paid differentially based on how well they performed on the post-training product knowledge test. Sales representatives, however, would be learning the material so that they could interact effectively with customers, which might also be linked to supervisory consequences. On the other hand, a pure retention study could not be easily conducted in an actual work setting. Once sales representatives were trained, they would be interacting with customers and practice effects would vary across participants.

Another limitation relates to the fluency goal. The fluency goal (29 correct answers in two minutes) was initially determined based on the performance of sales

representatives who completed similar training exercises that were designed by the instructional design firm that created the training programs used in this study. The goal was subsequently tested in a small pilot study with college students to ensure that it was reasonable and could be met in the allotted training time. However, the goal was not empirically assessed to determine whether it actually represented fluent performance. That is, it was not tested with actual sales representatives nor evaluated with respect to whether it led to greater retention, endurance, and application. Thus, the goal may actually have been too easy or too difficult. Also, fluent performance on the product knowledge test was not determined. The number of correct answers per minute would be lower on the product knowledge test than in training because participants had to type out the answers to the questions whereas in the training program they were only required to “think” the correct answer.

Strengths of the Study

This study extended previous studies because it compared the effectiveness of a fluency-building training program with a more traditional training program with adult learners who completed training programs that were designed to train actual sales representatives in the automotive industry. Only a few studies have assessed the effectiveness of fluency-building with adult learners. Although alternative interpretations are possible, results from Olander et al. (1986) and Bucklin et al. (2000) suggest that adult learners benefit from fluency-building training with respect to both acquisition and retention. However, neither examined actual employee training materials. Binder and Bloom (1989) and Binder and Sweeney (2002)

implemented fluency-building training with actual employees with very positive results, but both were case studies. Finally, in a very well controlled experimental study, Pampino et al. (2005) demonstrated the effectiveness of fluency-building training with construction foremen, but they did not compare the effects of fluency-building training with other types of training. The strengths of the current study, thus, include the fact that (a) it was a well-controlled experimental study, (b) that compared the relative effectiveness of fluency-building training with a more traditional, popular form of web-based training, (c) using actual employee training materials.

In the current study, the training programs were implemented in the same way that they would be implemented with actual sales representatives. Although some experimental control was sacrificed (specifically, as indicated above, practice was not controlled), realism was gained, making it more likely that the results will generalize to actual work settings.

Future Research

In this study, the fluency-building training program led to higher accuracy and fluency on the product knowledge test immediately after training, four weeks after training, and eight weeks after training. However, the accuracy and fluency rates for all three groups were relatively low. In addition, trainee satisfaction ratings for the fluency training group were relatively low, which may have affected their performance. Minor modifications (which are discussed below) could be made to the fluency-building training program that might enhance its effectiveness and trainee satisfaction with it. The first step would then be to assess the program to insure that it

results in high levels of accuracy and fluency immediately after training. Subsequent to that, studies, similar to this one, could examine the relative effects of the modified program on retention, endurance, and application, and ultimately, on-the-job transfer with actual sales representatives serving as participants.

First, it is recommended that the program be modified so that learners can review the question after answering. Several participants identified this as a feature that would have improved the program. This change might also improve acquisition as learners would have the opportunity to develop stronger intraverbal relations between the questions and answers.

Second, it is recommended that the program be modified so that participants can review only the flashcards they had difficulty answering. The current program is designed so that participants must go through all of the flashcards in each practice trial; that is, they must complete all 29 flashcards and cannot select only the cards they wish to review. Once again, several participants identified this as a weakness in the program. As with the aforementioned change, this change might also enhance the effectiveness of the program. If a trainee is having difficulty with a particular question, the intervening stimuli (i.e., the other flashcards) could well interfere with learning.

Third, it is recommended that pictures be added to the training material. This could be done in one of two ways. One would be to include some introductory material that establishes the context for several related flashcards. The second way would be to add pictures on the flashcards. As with the other two recommended

changes, a number of participants identified this as a weakness in the current program. Unlike the above two recommendations, this change would not be expected to increase the effectiveness of the program. This change could, however, increase trainee satisfaction with it.

Finally, it is recommended that objective evaluation of trainee performance be added to the program. As indicated earlier, only 20% of the participants in the fluency-building group reported that they met or exceeded the goal. These data suggest that objective evaluation may be necessary in order to motivate trainees to meet the goal. An objective assessment would also permit (a) a more valid assessment of the effectiveness of the training program, and (b) a more valid assessment of the benefits of fluency-building training in general.

To summarize, the first and second recommendations might increase both the effectiveness of the program and trainee satisfaction with it, the third might increase trainee satisfaction without increasing its effectiveness, and the fourth might increase the effectiveness of the program without increasing trainee satisfaction.

The results of this study and the preceding recommendations resulted from research sponsored by executives in an instructional design firm who requested an objective evaluation of their training programs. They did this so that they could continue to improve their training programs and provide their clients with the highest quality of training possible. They were also interested in contributing to the fluency research in general. Partnerships such as this can help provide training professionals with data they need to demonstrate the performance outcomes of their training

programs, which is essential for justifying the value of training investments.

Appendix A
Recruitment Script

Recruitment Script (In-Class Announcement)

Hello. My name is Rhiannon Fante, and I am a doctoral student in psychology at Western Michigan University. I am looking for individuals to participate in a study designed to evaluate the effects of three different training methods on the acquisition and retention of automotive product knowledge. The training simulates the training for newly hired automobile sales representatives and consists of an initial web-based training session followed by a written product knowledge test immediately after training, and retention tests four weeks after training, and again eight weeks after training.

If you have ever had or currently hold a job in the automotive industry, you are not eligible to participate because your automotive knowledge could influence your performance.

The initial training session will last about 2 hours, and each of the two retention test sessions will last about 30 minutes. In addition, potential participants will need to attend an introductory session prior to the beginning of the study.

Participants will be paid for their participation. They will receive between \$5.00 and \$15.00 for the initial training session depending upon how well they do on the test, and \$5.00 for each of the two retention tests. Thus, participants will earn between \$15.00 and \$25.00.

Your participation is completely voluntary and you may withdraw at any time. If you do withdraw, you will be paid the money you have earned up to that point. Your willingness to participate in the study or your withdrawal from the study at a later time will not affect your grade in this or any other class.

If you would like to learn more about this study, please print your name, phone number or email address, whichever is most convenient for you, on a sheet of paper and give it to me. I am also handing out a sheet of paper with my name and email address, and you can contact me by email if you prefer.

I will contact you within the next few days to arrange a time when we can meet to discuss the details of the study.

Thank you!

Appendix B
Recruitment Flyer

RESEARCH PARTICIPANTS NEEDED

I am looking for individuals to participate in a study designed to evaluate the effects of three different training methods on the acquisition and retention of automotive product knowledge. The training simulates the training for newly hired automobile sales representatives and consists of an initial web-based training session followed by a written product knowledge test immediately after training, and retention tests four weeks after training, and again eight weeks after training.

Participants will be paid for their participation. They will receive between \$5.00 and \$15.00 for the initial training session depending upon how well they do on the test, and \$5.00 for each of the two retention tests. Thus, participants will earn between \$15.00 and \$25.00. To be eligible to participate, you must be available for one 2-hour training session and two 30-minute retention sessions over a two month period. In addition, potential participants will need to attend an introductory session prior to the beginning of the study. Sessions will be conducted in Wood Hall. You are not eligible to participate if you have any automotive product knowledge.

If you are interested in learning more about this study, please contact Rhiannon Fante. Be sure to provide your name, e-mail address or telephone number, and the times you can be reached.

All information is confidential.

Thank you!

For more information contact Rhiannon Fante:

Phone: (586) 634-6550

E-mail: rhiannon.fante@wmich.edu

Rhiannon Fante rhiannon.fante@wmich.edu	Rhiannon Fante rhiannon.fante@wmich.edu	Rhiannon Fante rhiannon.fante@wmich.edu	Rhiannon Fante rhiannon.fante@wmich.edu	Rhiannon Fante rhiannon.fante@wmich.edu	Rhiannon Fante rhiannon.fante@wmich.edu	Rhiannon Fante rhiannon.fante@wmich.edu	Rhiannon Fante rhiannon.fante@wmich.edu	Rhiannon Fante rhiannon.fante@wmich.edu
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Appendix C
Typing Test Document

The cat (*Felis silvestris catus*), also known as the domestic cat or house cat is a small carnivorous species of crepuscular mammal that is often valued by humans for its companionship and its ability to hunt vermin. It has been associated with humans for at least 9,500 years.

A skilled predator, the cat is known to hunt over 1,000 species for food. It is intelligent and can be trained to obey simple commands. Individual cats have also been known to learn to manipulate simple mechanisms, such as doorknobs. Cats use a variety of vocalizations and types of body language for communication, including meowing ("meow" or "miaow"), purring, hissing, growling, squeaking, chirping, clicking, and grunting. Cats are popular pets and are also bred and shown as registered pedigree pets. This hobby is known as the "Cat Fancy".

Cats have 7 cervical vertebrae like almost all mammals, 13 thoracic vertebrae (humans have 12), 7 lumbar vertebrae (humans have 5), 3 sacral vertebrae like most mammals (humans have 5 because of their bipedal posture), and, except for Manx cats, 22 or 23 caudal vertebrae (humans have 3 to 5, fused into an internal coccyx). The extra lumbar and thoracic vertebrae account for the cat's enhanced spinal mobility and flexibility, compared with humans. The caudal vertebrae form the tail, used by the cat as a counterbalance to the body during quick movements. Cats also have free-floating clavicle bones, which allows them to pass their body through any space into which they can fit their head.

Cats have highly specialized teeth for the tearing of meat. The premolar and first molar together compose the carnassial pair on each side of the mouth, which efficiently functions to shear meat like a pair of scissors. While this is present in canids, it is highly developed in felines. The cat's tongue has sharp spines, or papillae, useful for retaining and ripping flesh from a carcass. These papillae are small backward-facing hooks that contain keratin which also assist in their grooming.

Thirty-two individual muscles in each ear allow for a manner of directional hearing: a cat can move each ear independently of the other. Because of this mobility, a cat can move its body in one direction and point its ears in another direction. Most cats have straight ears pointing upward. Unlike dogs, flap-eared breeds are extremely rare. (Scottish Folds are one such exceptional genetic mutation.) When angry or frightened, a cat will lay back its ears, to accompany the growling or hissing sounds it makes. Cats also turn their ears back when they are playing, or to listen to a sound coming from behind them. The angle of a cat's ears is an important clue to their mood.

Cats, like dogs, are digitigrades: they walk directly on their toes, the bones of their feet making up the lower part of the visible leg. Cats are capable of walking very precisely, because like all felines they directly register; that is, they place each hind paw (almost) directly in the print of the corresponding forepaw, minimizing noise and visible tracks. This also provides sure footing for their hind paws when they navigate rough terrain.

Unlike dogs and most mammals, cats walk by moving both legs on one side and then both legs on the other side. Most mammals move legs on alternate sides in sequence. Cats share this unusual gait with camels, giraffes, some horses ('pacers'), and a select few other mammals. There is no known connection between these animals which might explain this.

Like all members of family Felidae except the cheetah, cats have retractable claws. In their normal, relaxed position the claws are sheathed with the skin and fur around the toe pads. This keeps the claws sharp by preventing wear from contact with the ground and allows the silent stalking of prey. The claws on the forefeet are typically sharper than those on the hind feet. Cats can extend their claws voluntarily on one or more paws at will. They may extend their claws in hunting or self-defense, climbing, "kneading", or for extra traction on soft surfaces (bedspreads, thick rugs, etc.). It is also possible to make a cooperative cat extend its claws by carefully pressing both the top and bottom of the paw. The curved claws may become entangled in carpet or thick fabric, which may cause injury if the cat is unable to free itself.

Most cats have five claws on their front paws, and four or five on their rear paws. Because of an ancient mutation, however, domestic cats are prone to polydactyly, and may have six or seven toes. The fifth front claw (the dewclaw) is in a more proximal position than those of the other claws. More proximally, there is a protrusion which appears to be a sixth "finger." This special feature of the front paws, on the inside of the wrists, is the carpal pad, also found on the paws of big cats and dogs. It has no function in normal walking, but is thought to be an anti-skidding device used while jumping.

Cats possess rather loose skin; this allows them to turn and confront a predator or another cat in a fight, even when it has a grip on them. This is also an advantage for veterinary purposes, as it simplifies injections. In fact, the life of cats with kidney failure can sometimes be extended for years by the regular injection of large volumes of fluid subcutaneously, which serves as an alternative to dialysis.

The particularly loose skin at the back of the neck is known as the scruff, and is the area by which a mother cat grips her kittens to carry them. As a result, cats tend to become quiet and passive when gripped there. This tendency often extends into adulthood, and can be useful when attempting to treat or move an uncooperative cat. However, since an adult cat is heavier than a kitten, a pet cat should never be carried by the scruff, but should instead have their weight supported at the rump and hind legs, and at the chest and front paws. Often (much like a small child) a cat will lie with its head and front paws over a person's shoulder, and its back legs and rump supported under the person's arm.

Cat senses are attuned for hunting. Cats have highly advanced hearing, eyesight, taste, and touch receptors, making the cat extremely sensitive among mammals. Cats' night vision is superior to humans although their vision in daylight is inferior. Humans and

cats have a similar range of hearing on the low end of the scale, but cats can hear much higher-pitched sounds, up to 64 kHz, which is 1.6 octaves above the range of a human, and even one octave above the range of a dog. A domestic cat's sense of smell is about fourteen times as strong as a human's. To aid with navigation and sensation, cats have dozens of movable vibrissae (whiskers) over their body, especially their face. Due to a mutation in an early cat ancestor, one of two genes necessary to taste sweetness may have been lost by the cat family.

Cats conserve energy by sleeping more than most animals, especially as they grow older. The daily duration of sleep varies, usually 12–16 hours, with 13–14 being the average. Some cats can sleep as much as 20 hours in a 24-hour period. The term *cat nap* refers to the cat's ability to fall asleep (lightly) for a brief period and has entered the English lexicon – someone who nods off for a few minutes is said to be "taking a cat nap".

Due to their crepuscular nature, cats are often known to enter a period of increased activity and playfulness during the evening and early morning, dubbed the "evening crazies", "night crazies", "elevenses" or "mad half-hour" by some.

The temperament of a cat can vary depending on the breed and socialization. Cats with "oriental" body types tend to be thinner and more active, while cats that have a "cobby" body type tend to be heavier and less active.

The normal body temperature of a cat is between 38 and 39 °C (101 and 102.2 °F). A cat is considered febrile (hyperthermic) if it has a temperature of 39.5 C (103 F) or greater, or hypothermic if less than 37.5 C (100 F). For comparison, humans have a normal temperature of approximately 36.8 C (98.6 F). A domestic cat's normal heart rate ranges from 140 to 220 beats per minute, and is largely dependent on how excited the cat is. For a cat at rest, the average heart rate should be between 150 and 180 bpm, about twice that of a human.

Cats are classified as obligate carnivores, predominantly because their physiology is geared toward efficient processing of meat, and lacks efficient processes for digesting plant matter. Similarly as with its teeth, a cat's digestive tract has become specialized over time to suit meat eating, having shortened in length only to those segments of intestine best able to break down proteins and fats from animal flesh. The trait severely limits the cat's ability properly to digest, metabolize, and absorb plant-derived nutrients, as well as certain fatty acids. For example, taurine is scarce in plants but abundant in meats. It is a key amino sulfonic acid for eye health in cats. Taurine deficiency can cause a condition called macular degeneration wherein the cat's retina slowly degenerates, eventually causing irreversible blindness.

Despite the cat's meat-oriented physiology, it is still quite common for a cat to supplement its carnivorous diet with small amounts of grass, leaves, shrubs, houseplants, or other plant matter anyway. One theory suggests this behavior helps

cats regurgitate if their digestion is upset; another is that it introduces fiber or trace minerals into the diet. In this context, caution is recommended for cat owners because some houseplants are harmful to cats. For example, the leaves of the Easter Lily can cause permanent and life-threatening kidney damage to cats, and Philodendron are also poisonous to cats. The Cat Fanciers' Association has a full list of plants harmful to cats.

An unsupplemented vegetarian diet cannot meet a cat's dietary requirements. Nevertheless, there are several vegetarian or vegan commercially-available cat foods supplemented with chemically-synthesized taurine and other added nutrients that attempt to address nutritional shortfalls.

Additionally, cats have been known to develop a fondness for prepared human foods, normally such entrees which are rich in proteins or fats. However, a diet consisting only of human food (even if high quality meat) is unlikely to contain the balanced nutrition required by the cat. Cats normally are good self-regulators of diet; however, unlimited access to food, or excessive human-food 'treats', will often lead to the cat becoming obese, particularly if it is older or more sedentary. This may lead to several health complications, such as diabetes, especially in neutered males. Such health conditions can be prevented through diet and exercise (playing), especially for cats living exclusively indoors.

Cats can be selective eaters (which may be due in some way to the aforementioned mutation which caused their species to lose sugar-tasting ability). Unlike most mammals, cats can voluntarily starve themselves indefinitely despite being presented with palatable food, even a food which they had previously readily consumed. This can happen when the vomeronasal or Jacobson's organ becomes accustomed to a specific food, or if the cats are spoiled by their owners, in which case the cat will reject any food that does not fit the pattern it is expecting. It is also known for cats to merely become bored with their given food and decide to stop eating until they are tempted into eating again. Although it is extremely rare for a cat to deliberately starve itself to the point of injury, the sudden loss of weight can cause a fatal condition called hepatic lipidosis, a liver dysfunction which causes pathological loss of appetite and reinforces the starvation, which can lead to death within as little as 48 hours.

Some cats have a fondness for catnip, which is sensed by their olfactory systems. While they generally do not consume it, they will often roll in it, paw at it, and occasionally chew on it. The effect is usually relatively short, lasting for only a few minutes. After two hours or less, susceptible cats gain interest again. Several other species of plants (such as mint) cause this effect, to a lesser degree.

Cats can also develop pica. Pica is a condition in which animals chew or eat unusual things such as fabric, plastic or wool. In cats, this is mostly harmless as they do not digest most of it, but can be fatal or require surgical removal if a large amount of

foreign material is ingested (for example, an entire sock). It tends to occur more often in Burmese, Oriental, Siamese and breeds with these in their ancestry.

For cats, life in close proximity with humans (and other animals kept by humans as pets) amounts to a "symbiotic social adaptation" which has developed over thousands of years. The sort of social relationship cats have with their human keepers is hard to map onto more generalized wild cat behavior, but it is certain that the cat thinks of humans differently than it does of cats (i.e., it does not think of itself as human, nor that humans are cats). This can be seen in the difference in body and vocal language it uses with humans, when compared to how it communicates with other cats in the household, for example. Some have suggested that, psychologically, the human keeper of a cat is a sort of surrogate for the cat's mother, and that adult domestic cats live their lives in a kind of extended kitten-hood.

The typical negative stereotype of a cat describes a very solitary animal, prone to opacity or inscrutability as well as aloofness and self-sufficiency. However, cats are generally more social than usually thought, and indeed can be quite affectionate towards their human companions, especially if they imprint on them at a very young age and are treated with consistent affection. Some breeds like the Bengal, Ragdoll, Pixie-Bob, Ocicat and Manx are known to be very social by instinct.

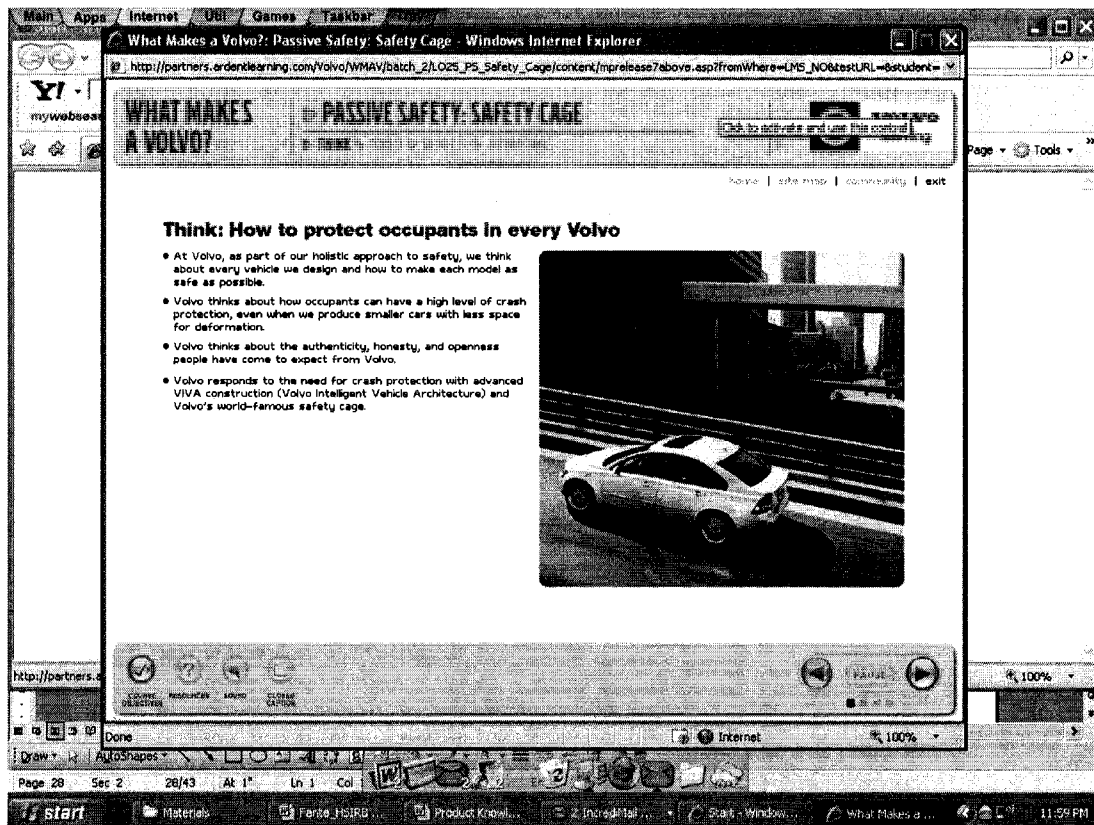
Regardless of the average sociability of any given cat or of cats in general, there are still any number of cats who meet or exceed the negative feline stereotype insofar as being poorly socialized. Yet with proper training and reinforcement of positive social behavior, poorly socialized cats can become more social over time. Older cats have also been reported to sometimes develop aggressiveness towards kittens, which may include biting and scratching; this type of behavior is known as Feline Asocial Aggression.

One way that it is possible to see how house cats are naturally meant to behave is to observe feral domestic cats, which are social enough to form colonies. Each cat in a colony holds a distinct territory, with sexually active males having the largest territories, and neutered cats having the smallest. Between these territories are neutral areas where cats watch and greet one another without territorial conflicts. Outside these neutral areas, territory holders usually aggressively chase away stranger cats, at first by staring, hissing, and growling, and if that does not work, by short but noisy and violent attacks.

Despite cohabitation in colonies, cats do not have a social survival strategy, or a pack mentality. This mainly means that an individual cat takes care of all basic needs on its own (e.g., finding food, and defending itself), and thus cats are always lone hunters; they do not hunt in groups as dogs or lions do. (Of further note in this context is that it is no coincidence how cats frequently tongue-bathe themselves: the chemistry of their saliva, expended during their frequent grooming, appears to be a natural deodorant. Thus, a cat's cleanliness would aid in decreasing the chance a prey animal could notice the cat's presence.

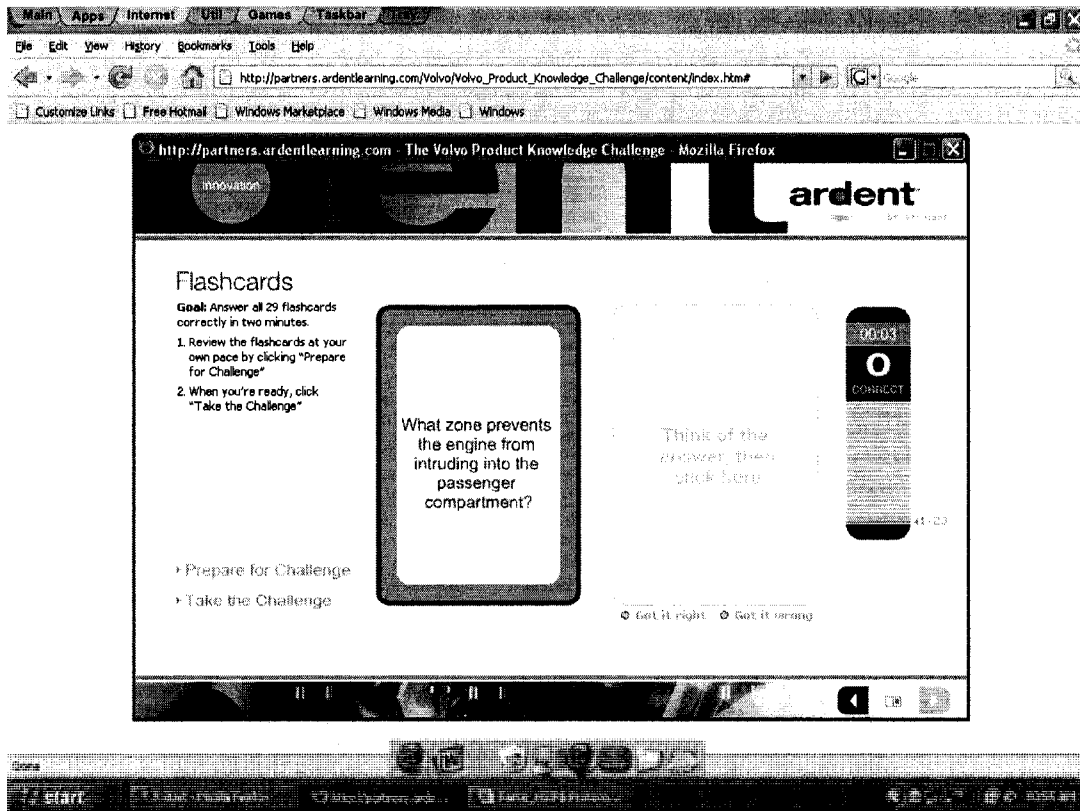
Appendix D

Screen Shot of Traditional Non-Fluency Web-Based Training Program



Appendix E

Screen Shot of Web-Based Fluency-Building Flashcard Training Program



Appendix F
Product Knowledge Test

Participant # _____

Product Knowledge Test

1. How does V!VA makes smaller more compact models?
2. What makes Volvo one of the safest vehicles on the road today?
3. What prevents intrusion into the vehicles passenger compartment?
4. Heavy duty members strengthen the attachment points for the _____ and _____.
5. What do the large single panels reduce?
6. The _____ deformation zone has crash boxes between the front of the side members to the bumper rail.
7. The weld strength and the _____ results in a strong body.
8. Extensive buttressing of the floor is achieved with _____ and _____.
9. What helps maintain the integrity of the safety cage?
10. What does V!VA provide for exceptional balance and nimble handling?
11. Safety cage construction provides resistance to _____.
12. Volvo's unibody design integrates multiple grades of steel into a _____ and _____.
13. What does V!VA stand for?
14. How many deformation zones does the S40 and V50 have?

15. The hood and trunk are stamped as _____ for greater strength.
16. S40 and V50 benefit from a longer _____ and wider _____.
17. The less a body flexes _____.
18. What has been incorporated into the body as structural support members?
19. The Volvo S80, V70, XC70, S60, XC90 are V!VA generation _____.
20. What helps maintain the structural integrity of the safety cage?
21. The Volvo S40 and V50 are V!VA generation _____.
22. The laser generates a strong weld to _____.
23. How does the V!VA design affect the interior of the car?
24. What is the benefit of transversely mounted front engines?
25. The _____ zone deforms the most and absorbs a lot of energy.
26. Volvo responds to the need for crash protection with _____ and _____.
27. What zone prevents the engine from intruding into the passenger compartment?
28. What does Volvo's innovative front crash boxes optimize?
29. What is the purpose of the multiple strength grades of steel?

Appendix G
Post-Session Data Recording Form

Data Recording Form

Participant Number: _____

Training Condition: Traditional / Traditional with Study Objectives/Fluency

Date	Session	Typing Speed/ Words per Minute
	Intro	

Date	Session	Training Completion Time
	Training	

Date	Session	Number Correct	Accuracy /Percent Correct	Fluency/Corre ct Responses per Minute	Fluency Retention	Accuracy Retention	Amt. Earned
	Training				N/A	N/A	
	Retention 1						
	Retention 2						
Total Amount Earned							

Directions for calculating retention levels

(1) Subtract the fluency and accuracy scores of the retention tests from the end of training accuracy and training scores.

Directions for calculating amount earned

- (1) Training completion: all participants earn \$5.00
- (2) Product knowledge test: participants earn \$10 multiplied by percentage correct
- (3) Retention sessions: all participants earn \$5.00 per session

Appendix H

Instructional Script: Traditional Non-Fluency Web-Based Training without Study Objectives

TRADITIONAL WEB-BASED TRAINING WITHOUT STUDY OBJECTIVES

In this session, you will complete an automotive safety product knowledge training program. You will be paid \$5 for completing the program. The training program that I am asking you to complete is similar to a training program completed by new automotive sales employees. The program consists of several informational screens. Please read each screen before moving on to the next screen.

{Conduct a brief tutorial of computer module to make sure the participant can use the program}

When you have finished the training program you will take a computer-based product knowledge test. You will be paid up to \$10 for the product knowledge test, based on your performance. For example, if you score 80% on the product knowledge test you would receive 80% of \$10, which is \$8.

You will have an hour and a half to complete the training program and prepare for the product knowledge test. Please feel free to go through the training program as many times as you would like to prepare for the product knowledge test. I will be in the room across the hall if you finish early and are ready to take the test.

Appendix I

Traditional Non-Fluency Web-Based Training Study Objectives

Volvo Safety Training Study Objectives

Passive Safety: Safety Cage

1. Be able to explain how Volvo responds to the need for crash protection.
2. Be able to explain what V!VA stands for.
3. Be able to identify what the safety cage construction provides resistance to.
4. Be able to describe the purpose of the multiple strength grades of steel.
5. Be able to explain how Volvo ensures a stronger, quieter, more durable car.
6. Be able to describe the purpose of the front crash boxes.
7. Be able to describe how extensive buttressing of the floor is achieved.
8. Be able to describe how the attachment points for the suspension system and drivetrain are strengthened.
9. Be able to describe how Volvo preserves panel strength.
10. Be able to explain how a strong body is achieved.
11. Be able to explain the purpose of using large single panels.
12. Be able to explain why the hood and trunk are stamped as one-piece.
13. Be able to describe how the integrity of the safety cage is maintained.
14. Be able to identify the structures that have been incorporated into the body as structural support members.
15. Be able to explain the purpose of the deformation zones.
16. Be able to explain why Volvo is one of the safest vehicles on the road today.

Chassis: V!VA

1. Be able to list the vehicles that are V!VA generation one.
2. Be able to list the vehicles that are V!VA generation two.
3. Be able to explain how V!VA makes smaller more compact models.
4. Be able to state where the ultra-high-strength steel is used.
5. Be able to list the two strengths of steel that form the bulk of the crash-force dissipation design.
6. Be able to explain the benefit of transversely mounted front engines.
7. Be able to list the two structures the S40 and V50 benefit from.
8. Be able to state the number of deformation zones on the S40 and V50.
9. Be able to state the deformation zone that has crash boxes between the front of the side members to the bumper rail.
10. Be able to state the zone that deforms the most and absorbs a lot of energy.
11. Be able to state the zone that prevents the engine from intruding into the passenger compartment.
12. Be able to explain how V!VA provides for exceptional balance and nimble handling.
13. Be able to describe how the V!VA design affects the interior of the car.

Appendix J

Instructional Script: Traditional Non-Fluency Web-Based Training Program with
Study Objectives

TRADITIONAL WEB-BASED TRAINING WITH STUDY OBJECTIVES

In this session, you will complete an automotive safety product knowledge training program. You will be paid \$5 for completing the program. The training program that I am asking you to complete is similar to a training program completed by new automotive sales employees. The program consists of several informational screens. Please read each screen before moving on to the next screen.

{Conduct a brief tutorial of computer module to make sure the participant can use the program}

When you have finished the training program you will take a computer-based product knowledge test. You will be paid up to \$10 for the product knowledge test, based on your performance. For example, if you score 80% on the product knowledge test you would receive 80% of \$10, which is \$8.

In addition, you will be provided with a set of study objectives to help guide you through the training material. The study objectives will let you know what material you should focus on and help you reach mastery on the product knowledge test. You may write on the study objectives, but you will not be allowed to use them on the product knowledge test.

{Hand the participant the study objectives}

You will have an hour and a half to complete the training program and prepare for the product knowledge test. Please feel free to go through the training program and use your study objectives as many times as you would like to prepare for the product knowledge test. I will be in the room across the hall if you finish early and are ready to take the test.

Appendix K

Instructional Script: Web-Based Fluency-Building Flashcard Training Program

WEB-BASED FLUENCY-BUILDING FLASHCARD TRAINING PROGRAM

In this session, you will complete an automotive safety product knowledge training program. You will be paid \$5 for completing the program. The training program that I am asking you to complete is similar to a training program completed by new automotive sales employees. The program is designed to simulate real flashcards. The two boxes on the screen represent the front and back side of the flashcard. To go from one flashcard to the next, all you need to do is simply click the boxes.

{Conduct a brief tutorial of computer module to make sure the participant can use the program}

When you have finished the training program you will take a computer-based product knowledge test. You will be paid up to \$10 for the product knowledge test, based on your performance. For example, if you score 80% on the product knowledge test you would receive 80% of \$10, which is \$8.

You will have an hour and a half to complete the training program and prepare for the product knowledge test. Please feel free to go through the training program as many times as you would like to prepare for the product knowledge test. I will be in the room across the hall if you finish early and are ready to take the test.

Appendix L

Instructional Script: Typing Test

Typing Test Instructional Script

People have very different keyboard skills. Your typing skills could influence how well you do on the test you take after you complete the training because you will take that test on the computer. Thus, we want to determine how well you type. This will not influence your participation in the study. We just need to take this into account when we analyze the results of the study.

It is very important that you type as quickly and accurately as you can. Please leave your personal belongings in this room, including cell phones, pagers, MP3 players, iPods, and any other similar electronic devices. If you need anything, just come get me – I will be in this room. I will come and stop you after 5 minutes. Again, please try to type as much of the document as you can as accurately as you can. Do you have any questions?

Appendix M

Instructional Script: Product Knowledge Test

Product Knowledge Test Instructions

Read each question and answer it as quickly and as accurately as you can. Type your answers in the space that is provided BELOW each question. Some of the questions are “fill in the blank questions” but you should still type your answers BELOW the question. This will permit you to respond more quickly. You will not be penalized for guessing. I will stop the test after 5 minutes. Stop typing immediately when time is called at the end of the test. You may not type any answers after time is called.

Appendix N

Post-Training Questionnaires

Post-Training Participant Questionnaire-Traditional

Participant Number: _____

Please complete the following questions. All information you provide will remain confidential.

1. About how many times did you go through the training program?

2. Please rate how well you think the training program helped you prepare for the product knowledge test.

1	2	3	4	5
Not at all	Very little	Somewhat	Much	A great deal

Comments:

3. Do you think that there is something that could have been added to the training program to help you better prepare for the product knowledge test?

4. Please rate how well you liked the training program.

1	2	3	4	5
Strongly disliked	Disliked	Neutral	Liked	Strongly liked

Comments:

5. If you liked or strongly liked the training program, what specifically did you like best about it?

6. If you disliked or strongly disliked the training program, what specifically did you dislike most about it?

7. Please rate the extent to which you found the training program to be fun and engaging.

1	2	3	4	5
Very boring	Somewhat boring	Neutral	Somewhat fun and engaging	Very fun and engaging

Why or why not?

8. Please rate the extent to which you would like to have this type of training program for an actual job.

1	2	3	4	5
Strongly dislike	Dislike	Neutral	Like	Strongly like

Comments:

Additional comments:

Post-Training Participant Questionnaire-Study Objectives

Participant Number: _____

Please complete the following questions. All information you provide will remain confidential.

1. About how many times did you go through the training program?
2. Please rate how well you think the training program helped you prepare for the product knowledge test.

1	2	3	4	5
Not at all	Very little	Somewhat	Much	A great deal

Comments:

3. Do you think that there is something that could have been added to the training program to help you better prepare for the product knowledge test?

4. Did you use the study objectives provided?

1	2
No	Yes

5. If you used the study objectives, did you study them during the 1 and ½ hour training session?

1	2
No	Yes

6. If yes, approximately how much time did you spend studying them?

7. If you did use the study objectives provided how well do you think they helped you prepare for the product knowledge test?

1	2	3	4	5
Not at all	Very little	Somewhat	Much	A great deal

Comments:

8. Please rate how well you liked the training program.

1	2	3	4	5
Strongly disliked	Disliked	Neutral	Liked	Strongly liked

Comments:

9. If you liked or strongly liked the training program, what specifically did you like best about it?

10. If you disliked or strongly disliked the training program, what specifically did you dislike most about it?

11. Please rate the extent to which you found the training program to be fun and engaging.

1	2	3	4	5
Very boring	Somewhat boring	Neutral	Somewhat fun and engaging	Very fun and engaging

Why?

12. Please rate the extent to which you would like to have this type of training program for an actual job.

1	2	3	4	5
Strongly dislike	Dislike	Neutral	Like	Strongly like

Comments:

Additional comments:

Post-Training Participant Questionnaire-Flashcards

Participant Number: _____

Please complete the following questions. All information you provide will remain confidential.

1. About how many times did you go through the training program?
2. Please rate how well you think the training program helped you prepare for the product knowledge test.

1	2	3	4	5
Not at all	Very little	Somewhat	Much	A great deal

Comments:

3. Do you think that there is something that could have been added to the training program to help you better prepare for the product knowledge test?

4. Did you try to meet the training program's goal (29 flashcards in 2 minutes)?

1	2
No	Yes

5. If you did try to meet the training program's goal, please rate how well you met the goal.

1	2	3	4
Did not meet the goal	Nearly met the goal	Met the goal	Exceeded the goal

Comments:

6. To the best of your recollection, specifically how many of the 29 flashcards did you correctly complete in 2 minutes?

7. Please rate how well you liked the training program.

1	2	3	4	5
Strongly disliked	Disliked	Neutral	Liked	Strongly liked

Comments:

8. If you liked or strongly liked the training program, what specifically did you like best about it?

9. If you disliked or strongly disliked the training program, what specifically did you dislike most about it?

10. Please rate the extent to which you found the training program to be fun and engaging.

1	2	3	4	5
Very boring	Somewhat boring	Neutral	Somewhat fun and engaging	Very fun and engaging

Why?

11. Please rate the extent to which you would like to have this type of training program for an actual job.

1	2	3	4	5
Strongly dislike	Dislike	Neutral	Like	Strongly like

Comments:

Additional comments:

Appendix O

Post-Study Questionnaire

Post-Study Participant Questionnaire

Participant Number: _____

Please complete the following questions. All information you provide will remain confidential.

1. What did you think this study was about?

2. Did you practice the material at any time during the 4 week intervals? If so, approximately how much time did you spend practicing?

Appendix P
Debriefing Script

Debriefing Script

Following the last session of participation:

1. Thank you for participating in this study.
2. I would like to explain the purpose of the study to you.

The purpose of this study was to compare the effects of a traditional non-fluency web-based training program with and without study objectives with a web-based fluency-building flashcard training program on the acquisition and retention of automotive product knowledge. What this means is that I was interested in comparing the number of correct responses per minute and percentage correct on the product knowledge test under the three different training conditions. Additionally, I was interested in comparing how much knowledge was lost at 4 weeks and 8 weeks after training.

You were one of the participants in the [traditional, traditional/SO, fluency] training group.

3. (Explain total pay earned to participant). You earned \$5 for completing the training program and you earned \$5 for each retention session, for a total of \$15. In addition, you earned [\$10 multiplied by percentage correct], on the end of training product knowledge test so your pay totals _____.
4. Do you have any questions about this study or your participation?

Appendix Q
HSIRB Approval Letter

WESTERN MICHIGAN UNIVERSITY



Human Subjects Institutional Review Board

Date: January 22, 2008

To: Alyce Dickinson, Principal Investigator
Rhiannon Fante, Student Investigator for dissertation
Cindy Han, Student Investigator
Alexis Kranz, Student Investigator
Amy Loukus, Student Investigator

From: Amy Naugle, Ph.D., Chair

A handwritten signature in cursive script that reads "Amy Naugle".

Re: HSIRB Project Number: 08-01-05

This letter will serve as confirmation that your research project entitled "A Comparison of Three Training Methods on the Acquisition and Retention of Automotive Product Knowledge" has been **approved** under the **expedited** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may **only** conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: January 22, 2009

Walwood Hall, Kalamazoo, MI 49008-5456
PHONE: (269) 387-8293 FAX: (269) 387-8276

Appendix R

Post-Training Questionnaire Results

Traditional Post-Training Participant Questionnaire Results (N = 20)

Question 1: About how many times did you go through the training program?

Training Condition	Response				
	1 Time	2 Times	3 Times	4 Times	5 Times
Traditional	4 (20%)	10 (50%)	1 (5%)	2 (10%)	3 (15%)

Question 2: Please rate how well you think the training program helped you prepare for the product knowledge test.

Training Condition	Response				
	Not At All	Very Little	Somewhat	Much	A Great Deal
Traditional	0 (0%)	6 (30%)	10 (50%)	4 (20%)	0 (0%)

Comments:

1. It was good with detail, I just couldn't retain all the information.
2. The answers to the questions on the Product Knowledge Test seemed obscure in the training program reading.
3. It was effective as advertisement, but not as training.
4. I didn't know what to read and study in particular questions seemed harder than info I was reading.
5. It has too much information "words" to read through.
6. It seemed like there was a lot of information in a small area.
7. Information was good but after reading through it once it was hard to keep focused on training

Question 3: Do you think that there is something that could have been added to the training program to help you better prepare for the product knowledge test?

1. Simpler words.
2. Highlight specific points.

3. Maybe repeat some of the things they stressed to be important or have little quizzes at the end of each section.
4. It seemed as though the training program repeated the same material or added unnecessary material at times.
5. Maybe like summary questions at the end of each site.
6. More accurate definitions to the test questions or else more subject based questions instead of distinctive answers.
7. Strong, defined objectives with coinciding questions following the information.
8. Yes, like making small statements.
9. Having the information spaced out more, not having all those things to click on.
10. Maybe looking at the test first would have helped.
11. Maybe explain what some of the material used was made of and why.
12. More interactive training.
13. Knowing what type of questions you will be asked.

Question 4: Please rate how well you liked the training program.

Training Condition	Response				
	Strongly Disliked	Disliked	Neutral	Liked	Strongly Liked
Traditional	0 (0%)	4 (20%)	11 (55%)	5 (25%)	0 (0%)

Comments:

1. It was well formatted, but repeated material.
2. Well put together, easy to read.
3. Nicely organized.
4. Pretty, but ineffective.
5. Clicking on the pictures was fun and more entertaining than just reading a screen.
6. It was boring.
7. It was fun and interesting.
8. Could use more explanation on how some of the technical things worked.

Question 5: If you liked or strongly liked the training program, what specifically did you like best about it?

1. It was detailed and I liked the dots how they told you info about the specific part of the car.
2. What I liked about the program was that it showed visuals.
3. The expansion dots were quite informative and very creative.
4. The interactive information slides.
5. Maybe just the way the picture has writing on them I didn't like.
6. How you could see different components on the car and were able to click on them to learn more.
7. Easy to follow along through it.
8. The training program was very informative.
9. I liked being able to go over it again and being able to click on specific items to get more information.

Question 6: If you disliked or strongly disliked the training program, what specifically did you dislike most about it?

1. What I didn't like was they used such different terminology I didn't know what the words meant.
2. The training program often repeated the same information. This was my strongest dislike.
3. The wording that they used.
4. Too many words to read.
5. It was very dry and boring. Not something that people enjoy reading unless you're into that.
6. Information was repetitive.

Question 7: Please rate the extent to which you found the training program to be fun and engaging.

Training Condition	Response				
	Very Boring	Somewhat Boring	Neutral	Somewhat Fun & Engaging	Very Fun & Engaging
Traditional	2 (10%)	9 (45%)	3 (15%)	5 (25%)	1 (5%)

Why or why not?

1. It had color and pictures that kept my interest.

2. The expanding dots were a nice touch. The diagrams also helped with my understanding of the automobile structure.
3. Lots of reading and not very interested in the content of the reading.
4. A lot of reading I didn't like.
5. It was an entertaining program, it's just not something I am very interested in or can relate to.
6. There was little to no visual effects nor much of anything that was interesting other than the facts.
7. The word engaging doesn't describe it at all since clicking a "next" arrow is not very engaging.
8. It was well-organized but ineffective.
9. You could visually see everything.
10. This training program has too many words.
11. There was a lot of words and nothing to "entertain" me.
12. Information was repetitive and wasn't eye catching enough to hold my attention.
13. There was a lot of information which was good, but the graphics were horrible to me and I just believe that it should have more color.
14. All you did was read off the screen and click on a couple different things. It was somewhat interactive but not much.

Question 8: Please rate the extent to which you would like to have this type of training program for an actual job.

Training Condition	Response				
	Strongly Dislike	Dislike	Neutral	Like	Strongly Like
Traditional	4 (20%)	8 (40%)	5 (25%)	3 (15%)	0 (0%)

Comments:

1. This job would seem like it required some professionalism, which I think the training program could expand a bit further upon.
2. Something more extensive would probably be more beneficial to me.
3. It is not a form of active learning nor is there a way to ask for clarification on questions or information provided.
4. It was well organized but ineffective.
5. It had its good qualities and bad qualities. I didn't like the cramming of information but the fact that it was interactive was cool.

6. I think that you have to go through the training program many times before you actually understand all the information.
7. I wanted to fall asleep the whole time and if I actually had to know that for a real job, I would fail at it because nothing stuck in my head.
8. I'm more hands-on learning, not just by studying.
9. It would be hard for me to learn the information in this way. Something more hands on or interactive would be better for me.
10. You don't have any hands on experience. I relate better having done it or at least walking through it in real life. Not just on a computer screen.

Additional comments:

1. I thought I had a good idea about most everything, but as I took the test, I realized I didn't know really anything.
2. There were tons of big words on the training program about the company's product that I tried to memorize but were too much. I think if practice questions were involved in the training slides it would have made the test easier.

Study Objectives-Training Participant Questionnaire Results (N = 20)

Question 1: About how many times did you go through the training program?

Training Condition	Response			
	1 Time	2 Times	3 Times	More Than 3 Times
Traditional with Study Objectives	5 (25%)	10 (50%)	1 (5%)	4 (20%)

Question 2: Please rate how well you think the training program helped you prepare for the product knowledge test.

Training Condition	Response				
	Not At All	Very Little	Somewhat	Much	A Great Deal
Traditional with Study Objectives	0 (0%)	0 (0%)	10 (50%)	5 (25%)	5 (25%)

Comments:

1. It was a lot of promoting Volvo and not so much about actual information.
2. I liked how the diagrams were interactive. It helped break up the reading and the visuals really helped.

Question 3: Do you think that there is something that could have been added to the training program to help you better prepare for the product knowledge test?

1. Sample questions after each section.
2. Maybe a tiny video. Not sure.
3. Less promotion/advertisement and more highlighted info.
4. Perhaps a self-diagnostic test to show which areas still need review.
5. Maybe if the information was organized a little more to make it easier to read and comprehend.

6. Model in motion, showing what happens and what safety features are used in a crash.

7. A practice knowledge test.

Question 4: Did you use the study objectives provided?

Training Condition	Response	
	No	Yes
Traditional with Study Objectives	1 (5%)	19 (95%)

Question 5: If you used the study objectives, did you study them during the 1 and ½ hour training session?

Training Condition	Response	
	No	Yes
Traditional with Study Objectives	1 (5%)	19 (95%)

Question 6: If yes, approximately how much time did you spend studying them?

Training Condition	Response				
	10-15 Min	20-25 Min	30-35 Min	40-45 Min	60 + Min
Traditional with Study Objectives	5 (25%)	3 (15%)	3 (15%)	6 (30%)	2 (10%)

Question 7: If you did use the study objectives provided how well do you think they helped you prepare for the product knowledge test?

Training Condition	Response				
	Not At All	Very Little	Somewhat	Much	A Great Deal
Traditional with Study Objectives	0 (0%)	0 (0%)	4 (20%)	6 (30%)	9 (45%)

Comments:

1. Without them, I wouldn't know what to be looking for.

Question 8: Please rate how well you liked the training program.

Training Condition	Response				
	Strongly Disliked	Disliked	Neutral	Liked	Strongly Liked
Traditional with Study Objectives	0 (0%)	1 (5%)	7 (35%)	11 (55%)	1 (5%)

Comments:

1. I'm not into or very familiar with automotives, but the training was still very interesting to me.
2. I liked that it was visual and straight-forward.

Question 9: If you liked or strongly liked the training program, what specifically did you like best about it?

1. It was clean, well-organized, and easy to understand.
2. The page visually showing what they wanted you to know.
3. Visuals and simplicity.

4. The presentation of the material was eye-catching and not like a bland textbook or lecture.
5. It was easy to follow and understand.
6. The information was also shown in pictures on the vehicles to help me understand better.
7. I really liked the interactive slides & the fact that they were brief helped break up the reading and helped me focus.
8. It didn't waste my time. Very short and detailed.
9. It was very detailed, good pictures/diagrams.
10. That I had both a very good study guide and the information on the computer.
11. I liked how it was online and easy to go through.
12. It was informative, well organized, and the test was prepared.

Question 10: If you disliked or strongly disliked the training program, what specifically did you dislike most about it?

1. I just found the information dull.

Question 11: Please rate the extent to which you found the training program to be fun and engaging.

Training Condition	Response				
	Very Boring	Somewhat Boring	Neutral	Somewhat Fun & Engaging	Very Fun & Engaging
Traditional with Study Objectives	1 (5%)	0 (0%)	7 (35%)	12 (60%)	0 (0%)

Why?

1. Had some interactiveness, was just set up well for a training program.
2. It wasn't interesting or boring.
3. A slideshow with information is never fun to me but it was interesting.
4. It was a bit boring but it was kind of colorful and engaging too.
5. The features in which you had to click around keeps the reader engaged.

6. Cars have never been interesting to me, and the material wasn't presented in a way to make them more so.
7. Interactive, but I really don't have a strong interest in cars.
8. Got to see how it works but didn't get to interact with the material.
9. It was somewhat interesting, but I wouldn't call it "fun."
10. It was somewhat fun because it broke up long blocks of text with other things to click on.

Question 12: Please rate the extent to which you would like to have this type of training program for an actual job.

Training Condition	Response				
	Strongly Dislike	Dislike	Neutral	Like	Strongly Like
Traditional with Study Objectives	0 (0%)	4 (20%)	4 (20%)	9 (45%)	3 (15%)

Comments:

1. Would take this as job training technique any day.
2. The program was good at showing and telling what it wanted to teach.
3. I find hands on training much easier to learn from and retain information. I can be trained by reading and memory, however I think a more hands on approach would be better. For example, looking at and studying the actual cars.
4. It didn't deliver the information well enough overall.
5. I would go over the material a lot more than I did if it were for a job. It seemed very helpful and fun. Like I said, before...easy to read, good diagrams.
6. I would prefer more hands-on training; reading a book or clicking through a website is very different from actually seeing/using/experiencing a product.
7. Would depend on subject matter.
8. It helped me learn a lot about the car so I think I could learn a lot about whatever job the training program was for.
9. It would be easy and I would be learning things, but I think it would get boring.

Additional comments:

1. The training contained a lot of information but the study objectives definitely made it easier.

Fluency Objectives-Training Participant Questionnaire Results (N = 20)

Question 1: About how many times did you go through the training program?

Training Condition	Response					
	1-5 Times	6-10 Times	11-15 Times	16-20 Times	21-35 Times	40-60 Times
Fluency	3 (15%)	8 (40%)	4 (20%)	1 (5%)	2 (10%)	2 (10%)

Question 2: Please rate how well you think the training program helped you prepare for the product knowledge test.

Training Condition	Response				
	Not At All	Very Little	Somewhat	Much	A Great Deal
Fluency	0 (0%)	2 (10%)	9 (45%)	4 (20%)	5 (25%)

Comments:

1. I just didn't go through it enough.
2. If I needed to study, I don't like to use "flashcard" format, or if I did I would use the flashcards in a different way.
3. It was hard because sometimes I get part of the answer right and part wrong.

Question 3: Do you think that there is something that could have been added to the training program to help you better prepare for the product knowledge test?

1. Pictures with labels.
2. If the flashcards were shown in groups of 5 instead of 29, I could have memorized them faster.
3. It was kind of difficult because I would have liked to go back to the previous question to look over it again.
4. It would have been better if the questions and answers showed at the same time.

5. A different form of study because the "flashcard" format doesn't always work for everyone.
6. Yes, after giving the answer to the question, we should be able to see the question again.
7. Maybe add pictures of the product they're talking about.
8. I think that be able to go back and look over the previous cards would have helped instead of having to go through the entire 29 cards to view it again.
9. Showing pictures of what was being taught.

Question 4: Did you try to meet the training program's goal (29 flashcards in 2 minutes)?

Training Condition	Response	
	No	Yes
Fluency	1 (5%)	19 (95%)

Question 5: If you did try to meet the training program's goal, please rate how well you met the goal.

Training Condition	Response			
	Did Not Meet The Goal	Nearly Met The Goal	Met The Goal	Exceeded The Goal
Fluency	8 (40%)	8 (40%)	3 (15%)	1 (5%)

Comments:

1. It took at one hour of going through the flashcards before I could meet the goal.
2. As I went through the cards more and more, I got closer to the goal but never actually met it.
3. It's tough to remember 29 in 2 min.
4. I was not close to meeting the goal even though I tried.
5. It was hard to remember part that I could not associate with mental pictures.
6. There was too much to learn all at once, and it got very frustrating to keep going and trying to get the answers correct.

7. Again if I was able to go back and view the cards that I was having trouble remembering I believe that I would have been more successful.
8. It was tricky, I think the best I did was about 3:30 minutes.

Question 6: To the best of your recollection, specifically how many of the 29 flashcards did you correctly complete in 2 minutes?

Training Condition	Response					
	1-5	6-10	11-15	16-20	21-25	26-29
Fluency	0 (0%)	4 (20%)	1 (5%)	5 (25%)	4 (20%)	6 (30%)

Question 7: Please rate how well you liked the training program.

Training Condition	Response				
	Strongly Disliked	Disliked	Neutral	Liked	Strongly Liked
Fluency	3 (15%)	4 (20%)	7 (35%)	5 (25%)	1 (5%)

Comments:

1. I study in a different way.
2. It was not effective.
3. I think it would have been better if the answer was something you had to choose verses guessing and checking.
4. It was just boring to me, and I'm better at studying with others because they can keep me focused most of the time.
5. After you clicked a card to see answer, you couldn't return to the question.
6. Could not go back to see word again after reading the term.

Question 8: If you liked or strongly liked the training program, what specifically did you like best about it?

1. I liked the flashcard format and the fact that there was a goal to meet, it felt like a game.
2. I liked the fact that it was flashcards. I thought it was fun and interactive.
3. The program was easy to use and informative as can be.
4. It was interesting to see how fast I could remember and how I could link the questions to answers using clues.
5. The flashcards were exactly what you needed to know.

Question 9: If you disliked or strongly disliked the training program, what specifically did you dislike most about it?

1. As I mentioned before, I could not go back to the question after they gave the answer during the study part that was not timed.
2. The way the questions and answers were set up.
3. It was boring.
4. No pictures to associate parts with.
5. I learned by repeating the cards I'm having troubles with, when it makes you go through every card when you only have an issue with a couple, it defeats the purpose of the flashcards.
6. I could not repeat a single flashcard in order to memorize.

Question 10: Please rate the extent to which you found the training program to be fun and engaging.

Training Condition	Response				
	Very Boring	Somewhat Boring	Neutral	Somewhat Fun & Engaging	Very Fun & Engaging
Fluency	4 (20%)	5 (25%)	2 (20%)	6 (20%)	1 (5%)

Why?

1. The program was different at first which made it boring but after I learned some of the cards it got more fun.
2. I really liked how animated and interactive it was.
3. It was an interesting program and I did get some useful info from it.
4. It was better than neutral but not what I'd consider "very fun and engaging."
5. There was no exciting part of learning or "memorizing" the flashcards. Nobody on the other side of the cards quizzing me made it boring as well. I'm not really the flashcard type.
6. Because getting an answer right is kind of rewarding.
7. No hands on, no visual learning (not-words).

Question 11: Please rate the extent to which you would like to have this type of training program for an actual job.

Training Condition	Response				
	Strongly Dislike	Dislike	Neutral	Like	Strongly Like
Fluency	4 (20%)	6 (30%)	6 (30%)	3 (15%)	1 (5%)

Comments:

1. It helped me to learn the information quickly but I don't think I would remember it unless I began to use it daily.
2. Would of preferred a Book of the Volvo V!VA Facts or a print out (something on paper rather than strictly on the computer).
3. It just really depends what job. It's great for a salesman but a mechanic needs to know much more.
4. It would have been okay but for myself I need to do this more than just one day, possibly several days, also I am a hands on learner so this was not the best teaching tool for me.
5. At a job training I prefer demonstrations and visuals to help me learn.
6. I'm more of a hands on learner.
7. Need more pictures.

Additional comments:

1. I just thought it was fun and helpful for my particular learning style. It is easy for me to learn when I feel like I am actually a part of the program/process. It is definitely a good tool.

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