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The effects of music and imagery on learning and attitudes in an industry training class

Valerie Hackmann Eastman
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The effects of music and imagery on learning and attitudes in an industry training class

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Iowa State University, 1990
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The effects of music and imagery on learning and attitudes in an industry training class

by

Valerie Hackmann Eastman

A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

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This study investigated the effects of music and imagery on learning and attitudes in an industry training class. One hundred forty-six clerical workers were divided into eight groups and given classroom training on tax reporting. Two groups each were exposed to one of four conditions: 1) music only, 2) imagery only, 3) both music and imagery, or 4) control. Subjects were given a pretest, posttest, transfer task, and an evaluation form. While test scores improved significantly from pretest to posttest, there were no significant differences between any of the conditions on the posttest, transfer task, and two of the evaluation items. However, the imagery condition showed significantly higher scores on the evaluation item "evaluation of course content". Reasons for these findings are discussed.
INTRODUCTION

It is estimated that industry spends more than $30 billion annually on training, involving 2 of every 3 workers and consuming more than 15 billion work hours (Huber, 1985). It has been used to teach people everything from operating the latest state-of-the-art equipment, to using new performance appraisal systems, to becoming more effective leaders. With such a broad spectrum of applications, it is no wonder there are a variety of training methods to choose from, ranging from on-the-job training to business games.

One of the most common forms of training is that of classroom instruction, where information is usually presented in a lecture format. Goldstein (1986) indicates this format is very common in educational environments or as a control procedure when analyzing other training techniques. He notes that while there are many criticisms and shortcomings of the lecture method, it has not often been evaluated in light of its own contributions to training effectiveness. Similarly, Wexley and Latham (1981) list several criticisms of the lecture format. These include the passive role of the learner, difficulty in transferring skills from a learning situation to a work situation, problems that educationally and socially deprived individuals might have in learning with this method, and a disregard for individual differences in trainees' abilities, interests, backgrounds, and personalities. Wexley and Latham point out, however, that the lecture method is useful for dissemination of information, such as introducing a new area of content. It can also be more effective when combined with other training techniques.
Carroll, Paine, and Ivancevich (1972) compared the available research on the effectiveness of various training methods and training directors' judgments about these training methods. Methods reviewed were programmed instruction, case study, conference or discussion method, role playing, sensitivity training, movie films, business gaming, TV lecture, and the lecture method. Training objectives were: knowledge acquisition, attitude change, participant acceptance, retention of what is learned, development of interpersonal skills, and development of problem solving skills. For all training objectives, both lecture and TV lecture methods were ranked lowest by the training directors. However, these rankings did not always reflect research results. For instance, the lecture method was found to be at least as effective, if not superior to, the discussion and movie film methods for the acquisition of knowledge. Also, lecture was not found to be inferior in achieving the objective of participant acceptance. In some cases the lecture method was found to be superior to the discussion method. The authors conclude that the lecture method is more effective for acquiring knowledge and for participant acceptance than the training directors believe.

Verner and Dickinson (1967) reviewed the literature on the lecture method and concluded that the lecture seems most suited to the diffusion of information for immediate recall and that augmenting the lecture with other appropriate techniques will facilitate learning. They also propose that, in order to be maximally effective, a lecture should be short and carefully constructed, simple in language and style, and present only
meaningful and uncomplicated material. Thus, the particular learning task to be taught dictates whether or not the lecture should be used.

It seems, then, that the lecture method should not be abandoned as a training technique. Instead, there may be ways to maximize its effectiveness in the work environment. A particular teaching technique which has most often been applied in classroom situations but which also may be applicable to industry training is called the Suggestive Accelerative Learning Technique (SALT). This technique is commonly used in conjunction with lecture. However, it also incorporates a combination of physical relaxation, suggestion, mental concentration, and dynamic presentation to enhance and even accelerate classroom learning.

Schuster and Gritton (1986) described SALT (Suggestive Accelerative Learning Techniques) in detail. They noted that the basis of SALT derives from Dr. George Lozanov's "Suggestopedia", which is the application of suggestion to education and learning. SALT is the American synthesis of Lozanov's Suggestopedia. The basic theory behind the Lozanov method includes three major premises:

1) Learning should be characterized by joy and the absence of tension.

2) As humans we operate with conscious and paraconscious levels.

3) Suggestion is the means to use the normally unused reserves of the mind for increased learning.

There are three basic phases to this method which can be modified according to the subject matter being taught. These phases are preliminary preparation, presentation of material, and practice of
material. During preliminary preparations, the teacher creates a favorable atmosphere by having a positive attitude and communicating to the students his or her high expectations that learning will occur. Physical relaxation exercises and mind-calming exercises may also be included during this phase. During the presentation phase there is a review of previous material, dynamic presentation of new material, and repetition of new material. Imagery and dramatics are used to present new material. Such presentation techniques are designed to use both brain hemispheres during learning. Repetition of new material is done with students in a passive but receptive state. This can be accomplished through the use of slow, rhythmical background music. The repetition of material can also be synchronized with the students' breathing. During the practice phase, students use the material they have just learned in some way, such as presenting a play or creating sentences using words they have just learned. Control or check quizzes are also used at this time. The quizzes are graded by the students and are not seen by the instructor.

Most research using this technique has involved elementary, high school, and college students learning subjects such as spelling, reading, and foreign languages. Its usefulness in training adults in the work force, however, has not been systematically or extensively evaluated. Altorfer (1983) has used suggestology, a technique similar to SALT, in seminars dealing with work relationships, people contact, and stress management. However, in these nontechnical training sessions, the emphasis was on self-motivation and attitude change, rather than on teaching work routines or technical skills. Schuster (1986) used SALT to
teach a short course on paper characteristics to industrial paper users. He found that the class taught using SALT learned 80% more than the class taught conventionally. However, the sample size used in this study was very small and only two groups (SALT and control) were used. The purpose of the present study is to conduct a more extensive evaluation of the effect of two SALT variables, music and imagery, on learning in an industry training class.
The particular SALT variables used in this study are music and imagery, so they will be discussed in more detail. According to Schuster and Gritton (1986), mental imagery is emphasized during the presentation-acquisition phase. Its purpose is to provide the student with more associations, and thus facilitate learning. The use of imagery in the classroom can be approached in two ways: by providing images to the students or by asking students to make their own images. Prepared images, for example, can be presented to the students on slides or overheads. Students are asked to look at the images, close their eyes, and try to picture the images in their mind. They are then asked to open their eyes, check the image, and repeat this process. Students can also be taught to make their own images.

Music can likewise be used to help students learn better (Schuster & Gritton, 1986). As with imagery, it also provides more associations by furnishing an additional input to the right brain hemisphere. There are several types of music that can be used to facilitate learning. The first of these is classical or romantic music. This type of music is lively and varies in volume level and tempo. It is recommended for use during the dramatic presentation phase, since the changes in volume and tempo tend to excite students and stimulate their imaginations. A second type of music is baroque music. This type of music is generally relaxing, with a steady rhythm and volume level. It is used primarily during the passive review with music. A third type of music is meditative or mood music. This type of music is very slow and "dreamy". It is most appropriately used during
mind-calming exercises and guided imagery trips during the preliminary phase. A final type of music is subject-appropriate music. For example, in a German language class, the instructor might play German folk songs. This type of music is often used during the practice phase.

An important concept in Suggestopedia and SALT which is particularly relevant to this study is that of whole brain learning. It is used to explain the effects of music, relaxation, imagery, psychodrama, and suggestion on learning (Schuster & Gritton, 1986). Lozanov (1978) advocates an instructional technique that addresses both hemispheres of the brain as well as the cortex and subcortex. In this way, both the conscious and paraconscious functions of the brain will be utilized.

Lozanov’s idea of using both brain hemispheres parallels the current popularity in the educational community of using whole-brain curricula as a method of tapping the specialized functions of both the right and left hemispheres. O’Boyle (1986) examined the literature relating to hemispheric laterality to determine if there are any implications or practical applications for learning and educational practice. He reviewed research on unilateral brain-damaged, split-brain, and normal populations. The evidence suggests that the two hemispheres make distinct, interactive contributions to performance in a wide variety of tasks. However, O’Boyle says that it is overstated and oversimplified to suggest that the left hemisphere is rational and the right hemisphere is emotional. Instead, complex cognitive processes appear to involve interaction between the two hemispheres. In fact, he points out that any differences between the hemispheres are quantitative rather than qualitative in nature. Although
he is more conservative in his position than Schuster and Gritton (1986), he does suggest that, in the classroom situation, the teacher should emphasize the interactive contributions of the right and left hemispheres in mastering cognitive skills. However, he also points out that, until further research is conducted, changes in teaching methods based on hemispheric laterality seem premature.

Qualls and Sheehan (1983) specifically identify imaginal processes, such as mental imagery, as being largely right hemisphere functions. Paivio (1975) also notes that research evidence seems to support the idea that imagery may be more of a right than left hemisphere function, whereas linguistic memory information is localized in the left hemisphere. A similar distinction has been proposed for music. For example, Gordon (1970) found a significant superiority of the left ear over the right in recognizing musical chords. However, no such difference was found for a melodies test. The author concluded that specific auditory or musical characteristics may be lateralized to the right hemisphere.

In the remainder of this literature review, research specifically related to the SALT variables of imagery and music will be discussed. While most of the research reviewed will be from studies on SALT, research from other sources will also be examined.

Music

As noted earlier, four different types of music are often used during a SALT class. Of these four types, the two types used in this study are classical and baroque. While classical music is used during the presentation phase in order to excite the students and stimulate their
imaginations, baroque music is used during the passive review in order to relax the students. Using music to relax students is meant to facilitate learning, since students are thought to learn better when relaxed than when anxious and nervous (Schuster & Gritton, 1986). Relaxation reduces the distractions, and subsequent hindrance of learning, caused by psychological tension. Thus, it is important to first examine the literature on relaxation and its effect on learning.

One of the most comprehensive studies on relaxation was done by Schuster and Martin (1980). They looked at whether relaxation would help or hinder students in learning rare vocabulary words. College students were classified into groups of high, medium, and low anxiety based on their scores on the State-Trait Anxiety Index. The students were also trained to either tense or relax their forehead muscle during the three list learning phases of preparation, actual learning, and testing. Other variables manipulated in this study were suggestion and test difficulty. The results showed that, as expected, high-anxious students performed worse than low-anxious students in learning the vocabulary words. In general, highly anxious students performed better when tensed in the learning situation than when relaxed, while low-anxious students typically did better when relaxed. However, even highly anxious students did better when given suggestion with an easy test and when relaxed with biofeedback prior to learning, during learning, and during testing. This suggests that even chronically anxious students can benefit when sufficient relaxation is given and maintained.
Schuster (1976) studied the effects of the alpha state, indirect suggestion, and the use of unusual imaginal associations on the learning of rare English words. The alpha state is characterized by a relaxed but alert mental state. Subjects were trained to use biofeedback in order to produce the alpha or non-alpha state on demand. For indirect suggestion, subjects were asked to remember an early pleasant learning experience. For the third independent variable, subjects were asked to make odd, weird, figurative, or highly unusual associations between the rare word being learned and its common synonym. Results showed a nonsignificant effect for the alpha state. In fact, recall was higher when subjects were instructed to make unusual associations and were also in the non-alpha state. There was also a nonsignificant trend for the triple interaction of mental state, indirect suggestion, and unusual associations, with the non-alpha state resulting in the highest recall. There was a significant main effect for unusual associations, as well as a significant interaction between suggestion and association. Schuster concluded that the alpha state itself does not produce superior learning and that the effort required of people to remain in the alpha state lessens one's ability to follow additional instructions.

Larsson and Starrin (1988) investigated how verbal ability, sequential thinking, and spatial ability are affected by long-term relaxation training. They hypothesized that, because spatial ability is a right hemisphere function, long-term relaxation would enhance performance on tasks requiring spatial ability but would not affect performance on tasks requiring verbal ability or sequential thinking since these are left
hemisphere functions. Contrary to expectation, however, performance was enhanced on all three of the tasks.

Moon, Render, and Pendley (1988) conducted a meta-analysis on 20 studies addressing the effects of relaxation on achievement. They found a small positive effect on cognitive academic variables for both elementary school children and college students. They note, however, that design and treatment flaws may have biased the results.

It appears that there is as yet no definitive answer concerning relaxation's proposed enhancement of learning. However, other research has looked at the effects of supposedly "relaxing" music. Smith and Morris (1976) looked specifically at the effects of stimulative and sedative music on the cognitive and emotional components of anxiety. Students from two psychology classes were randomly assigned to one of three treatment groups: stimulative music, sedative music, and no music. The subjects first completed a musical preference questionnaire, after which they were given a multiple-choice test during which five types of music (or no music at all) were played. All subjects also completed a questionnaire regarding their worry, emotionality, and expectancy levels at various times during the test. Results showed that stimulative music significantly increased both worry and emotionality. However, sedative music had no effect on anxiety, compared to the no-music condition. The researchers also reported that test performance was not affected by the music.

Logan and Roberts (1984) looked at the effects of two different types of relaxation music on tension level during a 20-minute relaxation
training session. One treatment group listened to music by Halpern, another group listened to "superlearning" music (baroque), while a third group heard no music. The dependent variable was a self-report measure of subjective tension level. Subjects were instructed to rate their tension level on eight different occasions during the training session. Results showed significant differences in tension levels only at the third and fourth data points, with those subjects listening to Halpern's music reporting significantly higher tension levels than those subjects hearing no music. Overall, the control group had the lowest tension levels of the three groups.

It appears, then, that "relaxing" music does not necessarily result in lower tension levels. Irrespective of this finding, however, this paper is more concerned with the effect of such music on learning. Schuster and Mouzon (1982) evaluated the effect of two different types of music on vocabulary learning of college students. One of two types of music (baroque or classical) or no music at all was played during learning of the vocabulary words, as well as while the subjects were taking a quiz over the vocabulary words. Subjects were also given a retention test one week later. Results showed that subjects who heard baroque music during learning had the highest test scores, both for acquisition immediately after learning, as well as retention one week later. Those subjects who heard classical music during learning had intermediate scores, with those hearing no music having the lowest scores. Those subjects hearing baroque music during the quiz had higher acquisition scores, but results were not significant for retention scores. Also, subjects who heard baroque music
during learning and during the quiz were more relaxed, alert, and happier, according to their subjective reports, than subjects who heard classical music or no music at all. The researchers interpreted this finding, along with that of higher test scores for those subjects hearing baroque music, as evidence for the facilitation of learning when people are in a relaxed state.

Render, Hull, and Moon (1984) studied the effects of guided relaxation and baroque music on college students' test performance. However, rather than playing the music during learning and acquisition, they used it only during testing. Four sections of an undergraduate course were used, along with four treatment conditions: 1) baroque music played during test administration, 2) guided relaxation immediately prior to test-taking, 3) the combination of baroque music played during testing and guided relaxation prior to testing, and 4) no relaxation or music. The treatments were administered for four unit tests throughout the semester, with each class section receiving all four treatments. Results showed no consistent effects for any treatment conditions. The researchers interpreted this result as implying that the use of music and guided relaxation may not be appropriate during testing only, but rather should also be used during learning and acquisition.

Stein, Hardy, and Totten (1982) studied the effect of music and imagery on retention of vocabulary words. Their rationale for using music and imagery was to improve information retention by increasing the number of input channels to the brain, since both music and imagery are considered to be right hemisphere functions. A quasi-experimental design
was used with three treatment conditions: music plus imagery, music only, and no treatment. All subjects were given a list of 25 defined vocabulary words to study, as well as a pretest and posttest. Subjects in the music-plus-imagery group heard Handel’s "Water Music" and the experimenter read the words aloud using a variety of vocal intonations. Subjects were also told to close their eyes in order to facilitate imagery. Subjects in the music-only condition heard the same music but the vocabulary words were not read aloud, while the subjects in the no-treatment group did not hear music or the words read aloud. All subjects were given a posttest immediately after the treatment and again one week later. Stein et al. found a significant difference in immediate posttest scores between the no-treatment and music-only groups. They also found a significant difference between the two experimental groups compared to the control group on delayed posttest scores. They concluded that certain baroque music appears to be a contributing factor for increasing both immediate and delayed information retention, whereas certain baroque music combined with imagery appears to increase delayed information retention.

Bordon and Schuster (1976) studied the effects of suggestion, synchronized breathing, and music on the learning and retention of Spanish words. Thirty-two college students were assigned to eight treatment cells with four participants per cell. In the suggestion condition, three factors were present: 1) an expectation that learning would take place, 2) instruction in the use of imaginal meditational procedures, and 3) an indirect suggestive atmosphere. In the breathing condition, subjects were trained to inhale to a count of two, hold their breath to a count of four,
and exhale to a count of two. In the music condition, baroque music was played during the learning session. In all conditions, subjects were given fifty Spanish words with their English translations. Subjects were given a posttest immediately following the learning session and again six weeks later. Results showed significantly higher scores on the immediate posttest for the conditions of suggestion, breathing, and music, as well as for the interaction of breathing and music. Scores on the delayed test were significantly higher for the conditions of suggestion, breathing, and music and the interaction of all three of these conditions.

Schuster and Miller (1979) manipulated many SALT-related variables in their study on the learning of rare English words. These variables included type of presentation, presence of music during review, gender, list difficulty, procedure used during practice sentence-making (alone vs. in pairs), and experienced vs. inexperienced SALT instructor. Sixty-four college students participated in this study, with two subjects assigned to each of 32 cells. After the learning period was over, all subjects were given an immediate acquisition quiz, as well as a retention quiz one week later. Contrary to expectation, the use of music and an active, dramatic presentation style did not result in greater test scores.

The studies just described have primarily used baroque music and have generally shown enhanced learning when subjects have been exposed to such music. The following studies investigated various types of music or noise and their effect on test scores.

Schuster (1985) conducted a laboratory study investigating the influence of many types of background music on the learning of vocabulary
words. He used seven different types of music (baroque, classical, dissonant, Japanese, march, meditative, and rock), as well as a control condition. Also, there were two different music selections for each type of music. Schuster found no effect on acquisition or retention scores for type of music. However, there were significant differences in acquisition scores among the music selections for classical, Japanese, and dissonant music types.

Schreiber (1988) investigated the influence of background classroom music on college students' achievement. A group of thirty psychology students heard background rock music for the first twenty minutes of each class while a different group of 34 students was not exposed to music during class. Results showed that the students in the music group earned significantly higher mean scores on examinations than those students in the no-music group.

Zimmer and Brachulis-Raymond (1978) compared student performance on an information-processing task under four conditions: popular music, connected speech, industrial noise, and a control condition. Results showed significantly poorer scores for the industrial noise condition compared to the control condition. There were no significant differences between the music and control conditions. The researchers suggested that, for more complex processing tasks, the facilitative effects of music on performance may not be present. This could be due to habituation, since students may "gate out" familiar stimuli, such as music played while studying.
One last study on music investigated the optimum speaking volume relative to background music (Schuster & Pansegrau, 1977). The researchers manipulated four independent variables in their study on the learning of rare English words. These four variables were speaking volume relative to background music during list presentation, previous list exposure, ability level, and sex of subject. Speaking volume was presented as below that of the background music, equal to the music level, or appreciably greater than the music level. Subjects were 42 college students assigned to one of six groups. All subjects were tested immediately after the learning phase and again one week later. Results showed that males learned more as speaking volume increased, whereas this interaction did not take place for females.

Overall, it appears that there is no definitive answer concerning the effects of music on learning, with some studies reporting positive results and others reporting no effect. However, it may be that other variables may mediate the relationship between music and learning. For instance, Daoussis and McKelvie (1986) looked at the musical preferences and study habits of 22 extraverts and 26 introverts. They found that most of the subjects (both extraverts and introverts) preferred rock and roll music. However, extraverts reported listening to music about 50% of the time while studying. Conversely, introverts reported listening to music while studying only about 25% of the time. Both groups, however, tended to play the music softly. The researchers concluded that extraverts play background music more often while studying in order to elevate their naturally low levels of arousal. In a second study, the researchers
played rock music while 24 students were given a "Reading Recall Test". Another group of 24 students was given the same test but they were no exposed to music. The scores for extraverts were similar in the two conditions. However, scores for introverts were significantly poorer in the music condition. According to the researchers, this suggests that the effects of music on cognitive performance are partly mediated by individual differences.

Redmond (1984) suggests a similar idea. She contends that, among other things, individual response patterns should be considered when selecting music. The same music may have different effects on different people, depending on their mood at the time. For instance, while quiet baroque music can enhance relaxation for some people, for others it may be a source of irritation when they are agitated.

To summarize the research on relaxation and music, it appears that relaxation does not necessarily enhance learning and that supposedly "relaxing" music is not necessarily "relaxing". However, a slim majority of the studies reported here showed positive effects of music on learning. The present study will also examine the influence of music on learning, although the application here will be with adults in an industry training class rather than in a laboratory setting.

**Imagery**

There are two popular theories used to explain mental imagery: dual coding theory and common coding theory. Dual coding theory, as described by Paivio (1971), identifies two sorts of coding or representation: images and verbal processes. Although these symbolic systems are
independent, they are also richly interconnected. According to this theory, there are three different levels or kinds of processing (Clark & Paivio, 1987). Representational processes occur when mental representations are stimulated by words or objects outside the organism. This process involves familiarity (i.e., perceptual recognition or identification). Referential processes operate when symbolic representation in one system activates representation in the other system. These connections allow the verbal and nonverbal systems to process information together. Finally, associative processes use within-system connections among imaginal or verbal representations. Clark and Paivio (1987) also suggest that the complexity of human thought arises because of the complex, elaborate, and dynamic connections both within and between the verbal and imaginal systems. The coding redundancy hypothesis proposes that memory performance is enhanced when the number of alternative memory codes available for an item increases (Richardson, 1980). Thus, items receiving both imaginal and verbal representations in memory are likely to be remembered.

Common coding theory, on the other hand, proposes that there is a single hypothetical system and that roughly the same general principles of relational organization apply to imaginal and verbal representations (Richardson, 1980). This approach stems from ideas expressed by Bower (1972) where he suggests that a common generative grammar (i.e., system of abstract propositional representations) underlies our verbal and imaginal systems and that the general principles of relational organization are similar within the imaginal and verbal systems. In other words, mental
imagery is not a qualitatively distinct form of mental representation, as it is described in dual coding theory (Richardson, 1980). Similar to dual-coding theory, items are more likely to be remembered if both imagery and verbal representations are used.

In reviewing literature related to these two theories, Richardson (1980) concluded that there is fairly good experimental evidence supporting the coding redundancy hypothesis as the appropriate theoretical approach for the investigation of pictorial memory. In the area of verbal learning, both the common coding and dual coding positions appear to be consistent with the available evidence, with the common coding theory being preferable since it is more parsimonious. He concludes, however, that, in general, there is inadequate empirical support for dual coding theory, whereas propositional theories, such as common coding theory, appear to have more promise for future investigations of memory. For purposes of the present study, either theory is appropriate since both interpret the effects of imagery instructions in terms of enhanced relational organization.

SALT-related research reviewed earlier suggests that imagery can enhance learning. For instance, Stein et al. (1982) found that imagery combined with baroque music appears to increase delayed information retention. Schuster (1976) found that using unusual imaginai associations enhanced recall of rare English words. Other SALT-related research has found similar positive results. For instance, Schuster and Wardell (1978) investigated which features of suggestopedia can be omitted once students have used the method in learning. The independent variables used in this
study were suggestive positive atmosphere, early pleasant learning restimulation, sex of subject, dramatic presentation plus mind-calming, and imagery plus sensory projection. Sixteen college students were assigned to one of four groups: suggestive positive atmosphere plus early pleasant learning restimulation, suggestive positive atmosphere only, early pleasant learning restimulation only, or a control group. The subjects were given nine lists of rare English words to learn, as well as all four possible combinations of dramatic presentation and imagery. Only the variable of imagery plus sensory projection produced a significant drop in scores when omitted. The researchers concluded that this particular variable is critical in maintaining superior learning.

Other studies have used children rather than college students as subjects, with similar positive results. Caskey and Oxford (1981), for instance, found that children trained to use mental imagery during concept acquisition exercises achieved higher scores on the Cognitive Abilities Test than did children in a control group. In fact, the differences became even more pronounced when age and intelligence were held constant. In another study involving children, Groff and Render (1983) investigated the effectiveness of three classroom teaching methods on achievement in a social studies unit. These three teaching methods were programmed instruction, simulation (role-playing), and guided fantasy (mental imagery). Results showed higher mean gains in achievement posttest scores for the programmed instruction and guided fantasy groups compared to the control group. Also, after controlling for pretest scores, it was found that subjects in the fantasy and simulation groups had significantly
higher retention scores than subjects in the programmed instruction and control groups. The authors concluded that any of these instructional methods can be used by teachers to facilitate student learning.

In addition to SALT-related research, other research on imagery has incorporated the use of various mnemonic strategies designed to enhance recall. For instance, Paivio and Desrochers (1979) compared the use of an imagery-based hook mnemonic and rote rehearsal on the recall and comprehension of French words. Twenty students were presented French words and their translations in four blocks of 24 words each. For half the blocks they were instructed to use the imagery technique, whereas for the other two blocks they were instructed to use rote rehearsal. The subjects were given a recall test after each block and a translation and familiarity test the next day. Results showed that the imagery mnemonic had a strong positive effect on both recall and comprehension, with the subjects recalling about three times as many words using imagery than using rote rehearsal. Other research has used the keyword method as an imagery-based mnemonic strategy for improving recall. For instance, Shriberg, Levin, McCormick, and Pressley (1982) found that eighth grade students who used the keyword method to remember names and accomplishments taken from short prose passages performed significantly better on a recall test than did control students.

Also concerning imagery, there has been some controversy about the effectiveness of bizarre vs. common images. It has been commonly thought that memory would be improved if the learner would try to produce bizarre mental images (Richardson, 1980). However, this idea has been challenged
by many researchers, including Nappe and Wollen (1973), who found that bizarre images produced no more correct responses on a cued recall test of noun pairs than did common images. In fact, bizarre images took longer to form, suggesting that common images are more efficient. Einstein and McDaniel (1987), on the other hand, concluded that bizarre imagery enhances performance under certain conditions, such as mixed lists when immediate retention is tested with free recall. They state that bizarre imagery can enhance memory performance but that there are boundary conditions to this enhancement.

Research concerning interactive vs. separative imagery is less controversial. In a review of the literature, Richardson (1980) concluded that instructions to use interactive imagery were much more effective than instructions to use separative imagery for improving recall. According to him, it is very important that mental imagery serve to increase the organization and cohesion of the material to be remembered. Thus, instructions to form separate images may not only have no effect on performance but could also possibly lead to a reduction in recall. Russell (1979) also concluded that imagery should be as interactive as possible in order to increase recall.

Research has also been done comparing imposed and generated pictures. For instance, Levin and Pressley (1983), in reviewing research using the keyword method, found that for elementary and junior high school students, imposed pictures were as good as, or better than, generated pictures. Also, studies using complex learning tasks and materials showed positive effects only with imposed pictures. However, it is not known whether
similar results would be found for adult subjects. Shriberg et al. (1982) found that recall was improved for eighth grade students who used either imposed or induced (generated) keyword images. However, they also found that the induced version was not as beneficial as the fully imposed version. Schuster, Stavish, and Burchinal (1976) found that neither imposed nor self-generated images initially enhanced college students' learning of rare English words. However, subsequent lists showed enhanced recall for subject-generated images.

In a review of the literature on imagery instructions in particular, Richardson (1980) has found evidence that the use of such instructions in learning verbal material has generally led to substantial improvements in memory performance. He states that long term or secondary memory is affected by the use of mental images, although empirical findings do not distinguish between dual coding theory or common coding theory in explaining these results. He notes that the majority of studies on imagery have been laboratory studies using very specific, mundane tasks. Thus, it may be that mnemonic techniques based upon mental imagery are of only limited value in assisting learning in everyday life, such as in a classroom situation.

Overall, it appears that imagery can be very effective in enhancing recall, although most studies have been laboratory studies so it is unclear whether such efforts would be effective in actual classroom situations. However, many types of imagery have been found to be effective, including, but not limited to, guided fantasy, imagery-based mnemonics, bizarre imagery, interactive imagery, imposed pictures, and
subject-generated pictures. The present study examined the influence of imagery on learning in an applied classroom training setting. The forms of imagery used included bizarre and common imagery and were primarily imposed.
THE PRESENT STUDY

The present study investigated the effects of imagery and music on learning in an applied setting. The purpose was to determine if people learn more in a training session if music and/or imagery are incorporated into the presentation. Imagery was chosen as a variable because it has shown such promise in laboratory studies (Paivio & Desrochers, 1979; Richardson, 1980) as well as in SALT-related research (Groff & Render, 1983; Schuster & Wardell, 1978; Stein et al., 1982). It was hoped that such positive results would be replicated in this applied setting. Music was chosen as the other variable to be studied because the research results in this area are less clear. Given the time and resource constraints of doing a field study, these were the only two SALT-related variables manipulated in this study. A full-blown test of SALT in its entirety was not done.

Kirkpatrick (1977) outlined four categories of measures used to evaluate the effectiveness of training outcomes. This taxonomy has become widely accepted in training departments and by the field of industrial/organizational psychology (Alliger & Janak, 1989). The four categories are:

1) reaction, an attitudinal measure of participants' feelings about a training program,
2) learning, the extent to which trainees have learned the information and skills,
3) behavior, the extent to which actual job behavior has changed,
4) results, the effect of the training program on results such as profits, sales, production quantity, absenteeism, turnover, etc. The categories assessed in the present study include reaction and learning. Due to practical limitations, changes in actual job behavior were not investigated. Also, it was thought that the category of results was irrelevant to this study since changes in these areas were not desired nor expected.

The training session used in this study was a one-time tax reporting class given to clerical workers at a large financial services company. This class was designed to give the workers some background information on tax reporting so that they would have a deeper understanding of the concepts involved and the reasons behind various job procedures. Imagery and/or music were incorporated into some of the classes to see if those people learned more (based on an immediate recall test and a transfer task) than people not exposed to imagery or music. An immediate recall test was used in a similar manner as had been done in previous research on SALT-related variables (Bordon & Schuster, 1976; Schuster & Miller, 1979; Schuster & Mouzon, 1982; Stein et al., 1982). A transfer task was used to see if subjects could apply material they learned to a hypothetical situation they might encounter on the job.

The rationale for using a transfer task stems from previous review articles on training. As noted by McGehee and Thayer (1961), the basic idea behind training is to transfer that which is learned to the job setting. Also, Wexley (1984) suggests that more empirical attention needs to be devoted to positive transfer of material learned in a training
situation. Traditional concepts used to maximize positive transfer include using identical elements, teaching underlying principles, and using overlearning (McGehee & Thayer, 1961). The concept used in this study is that of teaching underlying concepts whereby transfer is enhanced when the trainee understands the concepts, rules, or principles involved in a task. According to Goldstein (1986), this belief suggests that the training environment need not be similar to the transfer situation as long as underlying principles can be utilized.

A study done by Singer, Korinek, and Ridsdale (1980) looked at the influence of imagery, chunking, verbalization, and informed choice on the acquisition, retention, and transfer of a procedural task. The task used in this study required subjects to manipulate a predetermined sequence of buttons and switches. The transfer task was identical to the acquisition task except that in the transfer task switch positions were changed. The learning strategy groups were as follows: 1) imagery, with subjects instructed to mentally picture storage bins, 2) chunking, with subjects instructed to chunk responses into groups of three, 3) rote verbalization, with subjects instructed to repeat each response aloud, 4) informed choice, with subjects instructed to choose one of the three strategies (imagery, chunking, or verbalization), a combination of them, or a strategy of their choosing, and 5) a control group, with subjects given no particular strategy instructions. Contrary to their expectations, the researchers found that the informed choice group had higher acquisition scores than the chunking, verbalization, or imagery groups. However, those subjects using imagery performed better on the transfer task.
Other basic concepts concerning transfer of training are useful here. For instance, transfer can be either positive (training enhances performance on a second task), negative (training impairs performance on a second task), or nonexistent (training has no effect on performance on a second task) (Gick & Holyoak, 1987). Four general categories of transfer can also be identified: content to content, skills to skills, content to skills, and skills to content (Brooks & Dansereau, 1987). Content knowledge refers to relevant facts, concepts, and terms associated with particular topic areas whereas skills knowledge consists of the procedures, algorithms, and activities an individual is able to perform. This particular study involves content to skills transfer. It is also hoped that positive transfer will occur, such that the training class will enhance performance on the transfer task. However, this study does not assess this directly.

In a more practical and applied sense, Leifer and Newstrom (1980) state that training programs are not optimally effective because designers and presenters don't adequately consider how transfer of training to the work environment can be facilitated. Also, in today's economy executives are looking toward bottom-line results. However, Kelly (1982) estimates that only ten percent of training actually transfers skills back to the job.

Although the importance of assessing transfer of training is acknowledged, it should be noted that the transfer task used in this study is not a true test of the transfer of skills to the actual job setting. Instead, it is a simulated condition using a hypothetical situation.
Also, the task is administered immediately following the training session, which may or may not reflect actual changes in on-the-job performance.

A subjective evaluation of the training class was also used in this study. This is in accordance with previous articles which have emphasized the importance of assessing trainee reaction to training (Kirkpatrick, 1977; Noe, 1986). Its purpose in this study is to determine if those participants exposed to music and/or imagery will report more positive reactions to the training program than those not exposed to music or imagery.

It is hypothesized that, compared to subjects in the control groups, subjects who were exposed to music and/or imagery:

1) will have higher scores on an immediate recall test of course content,
2) will have higher scores on the transfer task, and
3) will report more positive subjective evaluations of the training class.

The highest scores are expected for the combination of music and imagery followed by imagery only and music only.
METHOD

Subjects

The subjects in this study were 146 clerical workers at a large financial services company in the Midwest. One hundred twenty three were female and 23 were male. Ages ranged from 18 to 53 with a mean age of 26. Subjects were drawn from ten departments within the organization.

The Iowa State University Committee on the Use of Human Subjects in Research reviewed this project and determined that the rights of the participants were insured, that any data they provided would be kept confidential, and that informed consent was obtained by appropriate means.

Materials

A packet of materials was prepared for each participant. It contained an informed consent statement, a background information form, a pretest, a posttest, a transfer task, and an evaluation form. All of the materials were prepared specifically for this study and are provided in Appendix A.

Informed Consent Statement

This form explained the purpose of the study and assured the confidentiality of the information provided by the participants. Those who agreed to participate in the study were instructed to sign and date the form.
This form contained the following information: job title, department, sex, age, months at present job, months at present company, and months at similar job (including time spent at the present company).

Multiple-Choice Tests

Multiple-choice tests were written independently by this researcher and an employee at the training site who was familiar with the course content. The items were based on the course outline developed by the instructor. Items were then edited by the course instructor and a specialist in item construction, and the edited items were combined into one list. The items were separated into two forms by this researcher and a training specialist at the training site, in order to have two roughly equivalent forms, Form A and Form B. Each form contained 31 multiple-choice items.

Transfer Task

This task was developed by the course instructor. It consisted of a description of a sample tax situation for a hypothetical person. Attached were hard copies of the computer screens the subjects use when entering tax information into the computer. There were five input sections with missing information such that subjects were expected to fill in the missing information, according to the information provided in the example. There was also one yes/no question, for a total of six "items" which needed to be completed by the subjects.
This form consisted of questions addressing the subjects' subjective evaluation of various aspects of the course. All items were rated on a scale from one to nine. The first seven questions concerned the subjects' evaluations of their understanding of each course objective both before and after the class. Each objective was rated on a scale from 1 to 9 such that 1=objective not at all satisfied, 5=objective moderately satisfied, and 9=objective completely satisfied. Subjects also rated course content and provided their overall rating of the course according to the following scale: 1=very poor, 3=poor, 5=fair, 7=good, and 9=very good. The subjects' overall attitude toward the class was rated according to 1=very negative, 3=somewhat negative, 5=neither positive nor negative, 7=somewhat positive, and 9=very positive. Two open-ended questions were asked concerning the subjects' opinions about the major strengths and weaknesses of the class. Space was also allowed for comments of any kind.

Procedure

The instructor was trained by Dr. Donald Schuster, an expert in SALT. There were two four-hour training sessions held on consecutive days. During the first session, the instructor was taught how to use both music and imagery. Although all four types of music were discussed, the use of classical music during presentation of new information and the use of baroque music during review of material were emphasized. For classical music, the instructor was told to play the music during presentation of new material and to speak as loud as or louder than the music. During review of material with baroque music, the instructor was told to read
along with the background music, flowing with the music and pausing between chunks of information. For imagery, the instructor was taught how to use imagery in two ways. The first was to have students close their eyes and imagine a scene or picture described by the instructor. The second type of imagery was to have students look at an image projected on a screen, close their eyes and picture each part of the image, open their eyes and look at the projected image to double-check their accuracy, and to close their eyes, picturing the image once again in their minds. At the end of the first training session, the instructor was told to develop appropriate imagery of both types for use with the course material he would present. The second training session was spent practicing each combination of treatment conditions along with presenting and reviewing the course material. Each treatment condition (music only, imagery only, both music and imagery, and neither music nor imagery) was practiced at least once or until Dr. Schuster judged the presentation to be correctly executed.

The topic of each of the training classes in this study was tax reporting. All of the participants were clerical workers, although there were several different job titles involved. All eight of the classes were conducted using a lecture format presented by the same instructor. (Appendix B contains a detailed outline of the course content.) However, there were four different conditions such that music and/or imagery were either present or not present as part of the class. The four conditions were as follows:

1) music only
2) imagery only
3) music and imagery
4) neither music nor imagery

There were two classes or groups for each condition for a total of eight classes. Groups One and Eight consisted of the music only condition, Groups Two and Seven used imagery only, Groups Three and Six used both music and imagery, while Groups Four and Five did not use either music or imagery. Each of the classes lasted approximately 1 1/2 to 2 hours, and all were presented within a four week time period with two classes being held each week.

One hundred sixty two subjects were assigned to classes by grouping them according to department and then numbering them from 1 to 8. This insured that the classes contained subjects from many different departments. Twenty-one people were assigned to groups 1 and 2, while 20 people were assigned to groups 3 through 8. As shown in Table 1, however, the people originally assigned to the classes were not necessarily the same subjects who attended those classes. For instance, due to schedule conflicts, from two to six people per class rescheduled the session they would attend, while from zero to 6 people failed to attend the class to which they were assigned. A total of 4 people declined to participate in this study. The resulting sample size consisted of 146 subjects.

Design

All classes were videotaped and conformed to the following format: Subjects were informed that the class they were taking was being used as part of a research study on training. They were told to remove the
Table 1. Determination of Total Number of Subjects Per Group

<table>
<thead>
<tr>
<th>Group</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assigned to class</td>
<td>+21</td>
<td>21</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Additional attended</td>
<td>+ 3</td>
<td>4</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Did not attend</td>
<td>- 5</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Cancelled/rescheduled</td>
<td>- 3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Declined to participate</td>
<td>- 0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>16</td>
<td>22</td>
<td>21</td>
<td>18</td>
<td>15</td>
<td>19</td>
<td>18</td>
<td>17</td>
</tr>
</tbody>
</table>

Form A/Form B sequence

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form A/Form B</td>
<td>9</td>
<td>11</td>
<td>10</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>sequence</td>
<td>7</td>
<td>11</td>
<td>11</td>
<td>9</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td>8</td>
</tr>
</tbody>
</table>
informed consent statement and the background information form from their packet of materials. They were asked to sign the informed consent statement if they were willing to have the information they provided used as part of this research study. They were also asked to complete the background information form. Both of these forms were then returned to the packet and the pretests were removed. In all classes, half of the subjects completed Form A of the pretest while the other half completed Form B. Answers were recorded on a separate answer sheet. Subjects were allowed to use as much time as needed to complete the 31 multiple-choice items. However, this never exceeded 20 minutes. After completing the test, subjects were told to place the tests back inside the packet. Class outlines were distributed for use by subjects to take notes during the lecture. In all classes, the course material was presented by the same instructor using a lecture format, along with overheads of appropriate tax forms. However, the classes varied according to whether or not music and imagery were used. After presentation of the course content (maximum length 50 minutes), the instructor described an example in order to illustrate the practical application of the material he just presented. Next, a break averaging 7 minutes in length was given, after which the material was reviewed (maximum length 13 minutes). Subjects were then told to put away all materials and to remove the posttests, transfer tasks, and evaluation forms from their packets. Those given Form A as the pretest were given Form B as the posttest. Conversely, those given Form B as the pretest were given Form A as the posttest. (Table 1 specifies the number of people in each class receiving a particular pretest/posttest
Subjects were instructed in the completion of all forms. The transfer tasks and evaluation forms were identical for all participants. Subjects were given as much time as needed to complete all forms. However, this never exceeded 25 minutes.

**Music Only Condition** During the music condition, classical music was played while the instructor presented new information. The instructor spoke at a volume the same as or louder than the music. A short break was taken after which the material was reviewed. Baroque music was played in the background during this review.

**Imagery Only Condition** In the imagery condition, students were periodically asked to imagine particular scenes or images during the presentation phase. They were also asked to look at tax forms projected on a screen, with important parts highlighted in color, and to close their eyes and picture those forms in their minds.

**Music Plus Imagery Condition** In this condition, both music and imagery were used, as described above.

**Neither Music Nor Imagery Condition** In this condition, music and imagery were not used. Instead, material was presented and reviewed using a straight lecture format. Overheads of tax forms were used but did not have important parts highlighted in color.

**Statistical Analysis**

The independent, dependent, and subject variables used in this study are presented in Table 2. Frequencies, means, and standard deviations were computed for the subject variables. Preliminary analyses included the computation of coefficient alpha (using the posttest scores for Forms
Table 2. Independent, Dependent, and Subject Variables

Independent Variables

- Presence or absence of music
- Presence or absence of imagery

Dependent Variables

- Pretest
- Posttest
- Transfer task
- Evaluation items
  - 7 items assessing knowledge of course content (before and after course)
  - Evaluation of course content
  - Overall rating of the class
  - Overall attitude toward the class

Subject Variables

- Sex
- Age
- Job title
- Department
- Experience
  - Months at present job
  - Months at present company
  - Months at similar job
A and B) in order to determine the level of internal reliability for each form. Also, the pretest means for both forms of the test were compared to determine if the tests were equivalent forms.

Correlations between the pre- and posttest scores and the transfer task scores were calculated, with a higher correlation expected between the posttest and transfer task scores. Correlations between experience and test scores (pre and post), transfer task scores, and attitudinal measures were also computed to determine if those people with more experience scored higher on the tests and/or had more positive attitudes toward the course. Finally, the correlation between actual posttest scores and the participants' estimated level of knowledge at the end of the course was used to determine the relationship between actual and perceived knowledge base following training.

In order to test the hypotheses, a 2x2x2 mixed analysis of variance was computed using the presence or absence of music and imagery as between-subjects factors and the pre- and posttest scores as within-subjects factors. An ANOVA was also computed using the attitudinal questions and transfer task scores as dependent measures.
RESULTS

Table 3 presents the number of males and females per group as well as the means and standard deviations of each group on the age, education, and experience variables. There were no significant differences between groups on any of these variables. The variable "months at similar job" is not listed in this table and was not used in any analyses since it was thought that the responses were inaccurate.

Coefficient alpha was computed using the posttests for both Form A and Form B of the multiple-choice tests. Internal reliability was demonstrated to be adequate, with a coefficient of .82 for Form A and .74 for Form B.

Table 4 presents the results of t-tests used to determine if there were any differences in pretest means between Form A and Form B, for each of the eight groups. No significant differences were found. Thus, the tests were assumed to be equivalent forms, and the remaining analyses reflect this assumption. An ANOVA comparing overall pretest means (with Forms A and B combined) showed no significant differences between groups (F=1.13, p=.348).

Table 5 presents the group means and standard deviations for the posttest scores, transfer task scores, and the evaluation items. Once again, there were no significant differences between the groups for any of these variables.

Table 6 shows the correlations among the dependent measures. Transfer task scores had an identical correlation with both the pretest and posttest scores. The evaluation items correlated more highly with the
Table 3. Demographic Variables Broken Down by Group

<table>
<thead>
<tr>
<th>Group</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tbody>
<tr>
<td>Female</td>
<td>12</td>
<td>19</td>
<td>20</td>
<td>15</td>
<td>13</td>
<td>16</td>
<td>13</td>
<td>15</td>
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<tr>
<td>Male</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Average age</td>
<td>24.6</td>
<td>24.6</td>
<td>27.9</td>
<td>25.1</td>
<td>27.1</td>
<td>29.4</td>
<td>24.6</td>
<td>24.9</td>
</tr>
<tr>
<td></td>
<td>(7.4)</td>
<td>(6.1)</td>
<td>(9.6)</td>
<td>(6.6)</td>
<td>(8.2)</td>
<td>(8.2)</td>
<td>(7.4)</td>
<td>(6.8)</td>
</tr>
<tr>
<td>Average number of months at present job</td>
<td>13.6</td>
<td>13.7</td>
<td>17.9</td>
<td>9.2</td>
<td>13.6</td>
<td>19.9</td>
<td>14.3</td>
<td>12.4</td>
</tr>
<tr>
<td></td>
<td>(14.5)</td>
<td>(10.8)</td>
<td>(29.8)</td>
<td>(9.4)</td>
<td>(7.3)</td>
<td>(25.9)</td>
<td>(17.2)</td>
<td>(10.0)</td>
</tr>
<tr>
<td>Average number of months at present company</td>
<td>41.9</td>
<td>30.8</td>
<td>50.3</td>
<td>24.9</td>
<td>36.2</td>
<td>37.8</td>
<td>28.6</td>
<td>27.9</td>
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<tr>
<td></td>
<td>(61.2)</td>
<td>(34.4)</td>
<td>(70.9)</td>
<td>(25.4)</td>
<td>(34.9)</td>
<td>(46.8)</td>
<td>(36.7)</td>
<td>(31.2)</td>
</tr>
</tbody>
</table>

Note: Standard deviations are in parentheses below means.
Table 4. Differences in Pretest Means Between Form A and Form B

<table>
<thead>
<tr>
<th>Condition</th>
<th>N</th>
<th>Overall Mean</th>
<th>Mean Form A</th>
<th>Mean Form B</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>16</td>
<td>15.19</td>
<td>15.00</td>
<td>15.43</td>
<td>1.53</td>
<td>.621</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.49)</td>
<td>(3.91)</td>
<td>(3.16)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>22</td>
<td>16.23</td>
<td>17.09</td>
<td>15.36</td>
<td>2.06</td>
<td>.270</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.50)</td>
<td>(2.81)</td>
<td>(4.03)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td>21</td>
<td>15.90</td>
<td>15.40</td>
<td>16.36</td>
<td>3.03</td>
<td>.111</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.78)</td>
<td>(2.68)</td>
<td>(4.65)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 4</td>
<td>18</td>
<td>13.78</td>
<td>13.67</td>
<td>13.89</td>
<td>1.92</td>
<td>.375</td>
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<tr>
<td></td>
<td></td>
<td>(3.32)</td>
<td>(2.83)</td>
<td>(3.92)</td>
<td></td>
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</tr>
<tr>
<td>Group 5</td>
<td>15</td>
<td>15.60</td>
<td>15.22</td>
<td>16.17</td>
<td>4.19</td>
<td>.072</td>
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<td></td>
<td></td>
<td>(3.89)</td>
<td>(2.68)</td>
<td>(5.49)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 6</td>
<td>19</td>
<td>16.05</td>
<td>15.67</td>
<td>16.40</td>
<td>1.54</td>
<td>.532</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.58)</td>
<td>(4.06)</td>
<td>(3.27)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 7</td>
<td>18</td>
<td>16.61</td>
<td>15.88</td>
<td>17.20</td>
<td>1.21</td>
<td>.774</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.05)</td>
<td>(3.23)</td>
<td>(2.94)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 8</td>
<td>17</td>
<td>16.06</td>
<td>15.67</td>
<td>16.50</td>
<td>4.06</td>
<td>.068</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.40)</td>
<td>(2.24)</td>
<td>(1.59)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Standard deviations are in parentheses below means.
Table 5. Group Means for the Posttest, Transfer Task, and Evaluation Items

<table>
<thead>
<tr>
<th>Group</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest</td>
<td>23.75</td>
<td>25.27</td>
<td>24.29</td>
<td>23.33</td>
<td>25.00</td>
<td>24.47</td>
<td>24.06</td>
<td>23.59</td>
</tr>
<tr>
<td></td>
<td>(4.30)</td>
<td>(3.37)</td>
<td>(4.95)</td>
<td>(5.60)</td>
<td>(3.84)</td>
<td>(4.25)</td>
<td>(3.81)</td>
<td>(5.17)</td>
</tr>
<tr>
<td>Transfer task</td>
<td>3.13</td>
<td>3.14</td>
<td>3.00</td>
<td>2.00</td>
<td>2.87</td>
<td>2.89</td>
<td>2.44</td>
<td>2.41</td>
</tr>
<tr>
<td></td>
<td>(1.59)</td>
<td>(1.46)</td>
<td>(1.45)</td>
<td>(1.53)</td>
<td>(1.51)</td>
<td>(1.49)</td>
<td>(1.72)</td>
<td>(1.54)</td>
</tr>
<tr>
<td>Evaluation of course content</td>
<td>6.87</td>
<td>7.43</td>
<td>6.62</td>
<td>6.50</td>
<td>6.73</td>
<td>7.06</td>
<td>7.06</td>
<td>6.33</td>
</tr>
<tr>
<td></td>
<td>(1.06)</td>
<td>(1.17)</td>
<td>(1.56)</td>
<td>(1.25)</td>
<td>(0.96)</td>
<td>(0.85)</td>
<td>(1.11)</td>
<td>(1.18)</td>
</tr>
<tr>
<td>Overall rating of class</td>
<td>6.80</td>
<td>7.14</td>
<td>6.80</td>
<td>6.06</td>
<td>6.40</td>
<td>6.12</td>
<td>6.61</td>
<td>5.81</td>
</tr>
<tr>
<td></td>
<td>(1.08)</td>
<td>(1.23)</td>
<td>(1.73)</td>
<td>(1.30)</td>
<td>(1.32)</td>
<td>(1.76)</td>
<td>(1.58)</td>
<td>(1.60)</td>
</tr>
<tr>
<td>Overall attitude toward class</td>
<td>7.19</td>
<td>7.52</td>
<td>6.57</td>
<td>6.33</td>
<td>6.53</td>
<td>6.65</td>
<td>6.56</td>
<td>6.06</td>
</tr>
<tr>
<td></td>
<td>(1.33)</td>
<td>(1.29)</td>
<td>(1.72)</td>
<td>(1.28)</td>
<td>(1.30)</td>
<td>(1.54)</td>
<td>(1.50)</td>
<td>(1.78)</td>
</tr>
</tbody>
</table>

Note: Standard deviations are in parentheses below means.
Groups 1 and 8 - music only.
Groups 2 and 7 - imagery only.
Groups 3 and 6 - both music and imagery.
Groups 4 and 5 - control.
### Table 6. Correlations Among Dependent Measures

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pretest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Posttest</td>
<td>.51*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Transfer task</td>
<td>.35*</td>
<td>.35*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Evaluation of course content</td>
<td>.24*</td>
<td>.32*</td>
<td>.35*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Overall rating of class</td>
<td>.20*</td>
<td>.28*</td>
<td>.38*</td>
<td>.72*</td>
<td></td>
</tr>
<tr>
<td>6. Overall attitude toward class</td>
<td>.22*</td>
<td>.31*</td>
<td>.31*</td>
<td>.73*</td>
<td>.81*</td>
</tr>
</tbody>
</table>

*Significant at .01 level.
**Significant at .001 level.
posttest scores than with the pretest scores, and the transfer task correlated more highly with "evaluation of course content" and "overall rating of the class" than either the pretest or posttest scores. All of the evaluation items were highly intercorrelated.

Correlations among the posttest scores and the seven items representing perceived level of knowledge at the end of the course ranged from .30 to .45. Correlations of these items with the transfer task scores ranged from .30 to .46. All were significant at p < .001. The items assessing perceived level of knowledge at the beginning of the course were not used in any analyses since it was thought that these items were not answered correctly by a large number of the participants.

Correlations among the two experience variables ("months at present job" and "months at present company") and the dependent measures revealed several significant relationships. For instance, the correlations between "months at present job" and the pretest (r=.21), posttest (r=.14), and transfer task (r=.19) were all significant at p < .05. Only one evaluation item, "evaluation of course content" (r=.14, p < .05), correlated significantly with this experience variable. "Months at present company" correlated significantly (p < .05) with the pretest (r=.26) and posttest (r=.18), as well as with the sixth item measuring perceived knowledge of course content.

In order to test the hypothesis that the imagery and music classes would have higher posttest scores, a 2x2x2 mixed analysis of variance was computed using the presence or absence of imagery and music as between-subjects factors and the pre- and posttest scores as within-subjects
factors. Results (shown in Table 7) reveal no significant differences for any of the variables. However, within-subjects analyses revealed that test scores did improve significantly from pre- to post-training. To ensure that the sequence of tests (Form A/Form B and Form B/Form A) did not have an effect, an analysis of variance was computed using sequence as the independent variable and posttest scores as the dependent variable. No significant differences were found. An ANOVA was also computed using transfer task scores and the evaluation items as dependent measures. A significant difference was found on the "evaluation of course content" item for the condition of imagery (F=4.83, p=.030). No other significant differences were found. Also, the mean of the three evaluation items was used as a covariate to control for the effects of attitude. Presence or absence of music and imagery were the independent variables and posttest scores and transfer task scores were the dependent measures. No significant differences were found for any of the treatment conditions.

The videotapes were reviewed in order to determine if the music and imagery variables were used correctly. The instructor was consistent in his presentation of imagery procedures. However he adjusted the volume of the classical music several times during the presentation phase of Group 3. Also, he inadvertently played classical music for the first several minutes of the review in Group 6. Upon realizing his mistake, he changed the tapes and finished the review with baroque music playing in the background.

In examining the posttest, transfer task, and evaluation item means for each condition (music, imagery, music and imagery, and control), in
Table 7. Mixed Analysis of Variance

<table>
<thead>
<tr>
<th></th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Between-Subjects Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>0.13</td>
<td>1</td>
<td>0.13</td>
<td>0.01</td>
<td>0.941</td>
</tr>
<tr>
<td>Imagery</td>
<td>54.59</td>
<td>1</td>
<td>54.59</td>
<td>2.29</td>
<td>0.132</td>
</tr>
<tr>
<td>Music by Imagery</td>
<td>8.62</td>
<td>1</td>
<td>8.62</td>
<td>0.36</td>
<td>0.548</td>
</tr>
<tr>
<td>Error</td>
<td>3382.71</td>
<td>142</td>
<td>23.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Within-Subjects Effects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre/Post</td>
<td>5299.84</td>
<td>1</td>
<td>5299.84</td>
<td>663.18</td>
<td>0.001</td>
</tr>
<tr>
<td>Music by Pre/Post</td>
<td>8.60</td>
<td>1</td>
<td>8.60</td>
<td>1.08</td>
<td>0.301</td>
</tr>
<tr>
<td>Imagery by Pre/Post</td>
<td>2.82</td>
<td>1</td>
<td>2.82</td>
<td>0.35</td>
<td>0.553</td>
</tr>
<tr>
<td>Music by Imagery by Pre/Post</td>
<td>10.58</td>
<td>1</td>
<td>10.58</td>
<td>1.32</td>
<td>0.252</td>
</tr>
<tr>
<td>Error</td>
<td>1134.79</td>
<td>142</td>
<td>7.99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
all cases (except for the transfer task) the imagery condition had the highest scores (Table 8). For the transfer task, the combination of music and imagery had the highest score. The lowest scores occurred for the music condition (posttest and "evaluation of course content") and the control condition (transfer task, "overall rating of class", and "overall attitude toward class"). This suggests that the condition of imagery may have had some effect but not strong enough to produce significant results.

In a post-hoc analysis, those particular items in posttest Forms A and B which were directly represented by imagery techniques were analyzed separately using analysis of variance to determine if this subset would show significantly greater scores for the imagery conditions. (The items chosen from Form A were 1, 8, 12, 14, 15, 16, 17, 19, 20, 21, 23, and 28. Those chosen from Form B were 3, 5, 8, 10, 11, 12, 15, 17, 19, 25, 26, and 30.) However, none of these effects were significant.
Table 8. Means for the Posttest, Transfer Task, and Evaluation Items Broken Down by Treatment Condition

<table>
<thead>
<tr>
<th></th>
<th>Music</th>
<th>Imagery</th>
<th>Both</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest</td>
<td>23.67</td>
<td>24.73</td>
<td>24.38</td>
<td>24.09</td>
</tr>
<tr>
<td></td>
<td>(4.69)</td>
<td>(3.58)</td>
<td>(4.57)</td>
<td>(4.88)</td>
</tr>
<tr>
<td>Transfer task</td>
<td>2.84</td>
<td>2.90</td>
<td>2.95</td>
<td>2.39</td>
</tr>
<tr>
<td></td>
<td>(1.53)</td>
<td>(1.55)</td>
<td>(1.45)</td>
<td>(1.56)</td>
</tr>
<tr>
<td>Evaluation of</td>
<td>6.60</td>
<td>7.26</td>
<td>6.81</td>
<td>6.61</td>
</tr>
<tr>
<td>course content</td>
<td>(1.13)</td>
<td>(1.14)</td>
<td>(1.31)</td>
<td>(1.12)</td>
</tr>
<tr>
<td>Overall rating of class</td>
<td>6.29</td>
<td>6.90</td>
<td>6.49</td>
<td>6.21</td>
</tr>
<tr>
<td></td>
<td>(1.44)</td>
<td>(1.41)</td>
<td>(1.76)</td>
<td>(1.22)</td>
</tr>
<tr>
<td>Overall attitude</td>
<td>6.61</td>
<td>7.08</td>
<td>6.61</td>
<td>6.42</td>
</tr>
<tr>
<td>toward class</td>
<td>(1.66)</td>
<td>(1.46)</td>
<td>(1.62)</td>
<td>(1.28)</td>
</tr>
</tbody>
</table>

Note: Standard deviations are in parentheses below means.
The data suggest that the people in the eight groups were relatively homogeneous, based on the nonsignificant differences on the background variables and the pretest means. This is true despite the potential contamination of random assignment which was produced when many of the subjects attended a different class than the one to which they were originally assigned.

The correlations among the dependent measures showed some interesting relationships. There was a significant correlation between pretest and posttest scores, which is to be expected since those scoring higher on the pretest should also have scored higher on the posttest. However, both the pretest and the posttest had identical correlations with the transfer task. Although a positive correlation between the pretest and transfer task was expected, it was also expected that the posttest and transfer task would have a higher correlation since both were completed after training, and supposedly learning, had taken place. However, the scores on the transfer task tended to be low with the average score being 2.75 out of a possible score of six. Thus, the transfer task appeared to be difficult, despite the training which had been provided.

Correlations between the pretest and posttest and evaluation items were all positive. This suggests that those people with higher scores on the tests evaluated the course more highly than did those with lower scores. This is especially true for the posttest, which had higher correlations with these items than the pretest. This is understandable since those who felt they had done better on the test would probably have
a more positive attitude toward the class and its value to them. In a similar vein, the transfer task correlated even more highly with "evaluation of course content" and "overall rating of class" than did the posttest. Once again those people who felt more confident about their ability to complete the transfer task probably also felt more positive about the course.

All three of the evaluation items were highly intercorrelated, suggesting that those who felt the course content was good also had a positive attitude toward the class. Such high correlations may also suggest the presence of a halo effect. In general, the evaluations were above average, with a mean of 6.84 for "evaluation of course content", 6.49 for "overall rating of class", and 6.69 for "overall attitude toward class". This represents a response of from "fair" to "good" for "evaluation of course content" and "overall rating of class" and a response of "somewhat positive" for "overall attitude toward class". In summary, it appears that the participants tended to like the course and think it was worthwhile.

Correlations among the posttest, the transfer task, and the seven items representing perceived level of knowledge at the end of the course were also significant. This indicates that there is some correspondence between actual and perceived knowledge following training. In other words, those people who thought they had learned something from the course apparently did so based on their higher posttest and transfer task scores.

As a rule, those people with more experience did not evaluate the course itself or their own knowledge after training more highly than did
those with less experience. However, those people with more experience had higher scores on the pretest, posttest, and transfer task. It is interesting to note, however, that correlations between experience and pretest scores were higher than between experience and posttest scores. This suggests that those people having more experience also had more knowledge of course content prior to the training. However, once the training took place, the effect of experience was not as strong, since now even those people who were relatively inexperienced had knowledge of the course content.

Results of this study found no support for any of the proposed hypotheses. The only significant difference found was that of higher evaluations of course content for the imagery condition. Many different explanations could be proposed to explain the lack of significant effects. One of these is that the variables of music and imagery do not, in fact, have any effect on learning or attitudes. In light of previous findings (Zimmer & Brachulis-Raymond, 1978; Schuster & Miller, 1979; Daoussis & McKelvie, 1986), it was not necessarily surprising that music had no effect on learning. In addition, twenty people (out of 73 exposed to music) made negative comments on their evaluation forms regarding the music used during the class. The more frequent comments suggested that the music was distracting or made them sleepy. This supports the idea proposed by Redmond (1984) and Schuster (1985) that people may not respond positively to the music selections. Redmond (1984) contended that the same music can be relaxing for some people and irritating to others. This is evidence of the influence of individual differences which may moderate
the effects of music. Also, as proposed by Schuster (1985), the particular music selection used may have more of an effect on learning than the type of music. In fact, the music only condition in this study had the lowest scores on the posttest and the "evaluation of course content" item than even the control condition. This situation may have been influenced by the particular music selection or by the distraction some participants reported the music to cause. The instructor also played the wrong music momentarily during the review for Group 6 and adjusted the music volume several times during the presentation phase for Group 3. (Both of these groups used a combination of music and imagery.) These interruptions may have influenced test scores and attitudes for these groups.

The lack of any effect for imagery is a little more difficult to explain, particularly in light of the many positive findings of previous studies (Schuster, 1976; Schuster & Wardell, 1978; Caskey & Oxford, 1981; Stein et al., 1982; Groff & Render, 1983). However, most of these studies were laboratory studies. Imagery has rarely been evaluated in field studies with adults. It may be difficult to apply imagery in a field setting. For instance, when material is presented in a lecture format, it is difficult to incorporate every proposition into a particular imagery technique. Although studies have successfully used imagery to enhance recall of prose (Shriberg et al., 1982; Peters, Levin, McGivern, & Pressley, 1985), these instances still tended to be very specific and did not involve an entire 45-minute lecture. Richardson (1980) points out that mnemonic techniques based on mental imagery, which have received
considerable research support in laboratory studies, are very limited in their range of possible applications. However, in this study, even when those items directly addressed by imagery were analyzed, still no effects were found for the imagery condition. Thus, some other explanation must be found.

It is possible that the imagery used in this study was not appropriate. For instance, mnemonic keyword methods and imagery-based hook mnemonics, which have found considerable research support (Paivio & Desrochers, 1979; Richardson, 1980; Shriberg et al., 1982; Levin & Pressley, 1983), were not used. Instead, subjects were asked to imagine particular situations or were asked to look at tax forms projected on a screen and imagine them in their minds. Such applications of imagery may not be as effective as certain mnemonic keyword strategies.

Another possibility would be that a delayed test would have shown more effects for imagery. Such findings were reported by Stein et al. (1982) who suggested that multiple channels of input may have little effect on short-term retention but may still enhance long-term retention. Had the subjects in this study been tested again several weeks after the training course, effects for imagery may have been found.

It is also conceivable that the participants in the imagery conditions may not have used imagery even though it was incorporated into the lecture. They were not asked if they actually used the imagery or if it was helpful to them. In addition, Richardson (1983) and Slee (1983) suggest that people vary in their ability to form and control vivid memory images. Slee states that it is unrealistically hopeful to expect that all
students will experience enhanced visual memory as the result of introducing imagery strategies into the classroom.

There were also some threats to internal validity in this study. For instance, since the training classes were spread out over four weeks, participants could have talked to each other outside of the class about the course content and/or the use of music or imagery during the classes. In addition, since subjects were allowed to take notes during the class, whether or not people did so may have had more of an impact on learning than either music or imagery.

Some threats to external validity were also present. For instance, only one company, one job classification (clerical workers), and one instructor were used. Also, most of the participants were female. There were too few males to make any valid comparisons investigating possible differential effects of music or imagery on males versus females.

It may be important to note that even though no significant effects were found for imagery, the mean scores on the posttest and evaluation items were higher for this condition than for any other. Also, transfer task scores and responses to "overall rating of class" and "overall attitude toward class" were lowest for the control condition. This suggests that imagery may have had some effect on learning but not strong enough to be significant. Also, those people exposed to imagery evaluated the course more highly than did people not exposed to imagery. This is in spite of the comments from 6 people suggesting that they didn't like having to close their eyes or that the imagery techniques didn't work. However, three people made positive comments about the use of imagery.
Thus, although only one significant effect was found for "evaluation of course content" in the imagery condition, the hypotheses were partially supported relative to the direction of the means. For instance, the control condition was lowest on the transfer task and two of the evaluation items, whereas the imagery condition or the combination of music and imagery was highest on the posttest, transfer task, and all three of the relevant evaluation items. On the other hand, the music condition had the lowest scores on the posttest and responses to the "evaluation of course content" item, suggesting that the subjects' dislike of the music or the distraction it provided may have influenced their scores and attitudes.

The small difference in means for the imagery condition may not have been due to imagery's enhancement of learning, however. One possibility is that the novelty of the situation may have had more of an influence. However, the novelty of listening to music during a training class did not serve to enhance scores in that condition. Instead, it seemed to be that music was even somewhat detrimental to learning and attitudes, since the music condition showed the lowest scores on several of the dependent measures.

In summary, this study generally found no significant effect on learning or attitudes for either music or imagery. However, this does not completely eliminate the possibility that these variables can enhance learning. This study had several weaknesses which may have prevented these variables from having any effects on learning or attitudes. For instance, a different selection of music may have been more well-liked by
the participants. Also, the use of different imagery techniques might have enhanced learning to a greater degree. In addition, an application of SALT in its entirety may have resulted in greater effects, since it is possible that a combination of techniques is much more effective than using the individual techniques in isolation.

Obviously more research needs to be done in this area. For instance, little research has been done comparing particular imagery techniques. Also, it is obvious that the use of particular music selections and their like or dislike by participants needs to be addressed more systematically. In general, however, research still needs to continue in the effort to discover ways of making classroom instruction more beneficial. Although many training directors ranked it lower than many other training methods relative to its ability to achieve certain training objectives (Carroll, et al., 1972), classroom instruction is still often the most expedient method to impart information to people. In addition, it is not always the "necessary evil" it is perceived to be, since it can be effective for acquiring knowledge. This study, in fact, suggests as much since test scores improved significantly from pre- to post-training. However, there may still be ways, imagery and music not excluded, to make classroom instruction more effective and to improve its stature as a reputable training method.
REFERENCES


ACKNOWLEDGEMENTS

I would like to thank everyone who assisted me in the completion of this dissertation. My sincerest gratitude to Dr. Donald Schuster for providing the instructor training and for his general help and encouragement in spite of his own hardships. I would also like to thank Dr. Gary Phye for graciously consenting to be my co-major professor and for providing me with his invaluable guidance, especially at the end of my graduate career. Many thanks also to Dr. Carl Roberts, Dr. Tom Andre, Dr. John Wilson, Dr. Leroy Wolins, and Dr. Wilbur Layton for their advice and suggestions. I am also grateful for the help and cooperation I received from the personnel at the company involved in this study, without which this research could never have been done. Finally, and most importantly, I'd like to thank my husband Greg for his love, support, and encouragement throughout my graduate studies. Also thanks to my son, Connor, who was not always cooperative but was always fun to come home to.
APPENDIX A. TESTING AND SURVEY INSTRUMENTS
Informed Consent

This training class is part of a research project conducted by Valerie Eastman at Iowa State University. The results will be used to assess the effectiveness of the training program in which you are enrolled. You will be given a test both before and after the course in order to see if the training you received helped you to learn the course material. It is hoped that the results of this research will help your company to design more effective training programs.

Although your cooperation is desired, you are free to withdraw your consent at any time. Every effort will be made to keep confidential any information you provide. If you have any questions about the project, you may contact Valerie Eastman at 294-8126. The address is: Department of Psychology, Iowa State University, Ames, Iowa 50011. If you consent to participate in this project, please sign and date this form on the line below.

_________________________________________   ___________
Signature                                                               Date

Background Information

Date____________________

Job Title_________________________________________________________

Sex:     ____Female     ____Male

Age________

How long have you worked at your present job?     _____years _____months

How long have you worked at Principal?               _____years _____months

How long have you worked at a job similar to the job you now have? (Include the time you have worked at Principal as well as any time spent at another company.)    _____years _____months
Print your name, last name first, on the appropriate place on your answer sheet. Blacken the ovals corresponding to each of the letters. Under "Identification Number", beginning in column "A", write your Social Security Number and blacken the ovals corresponding to the appropriate numbers.

Choose the best answer to each question and blacken the corresponding oval (a, b, c, or d) next to each item number on the answer sheet. There are 31 items on the test. After you have completed all of the items, put the answer sheet inside of the test and place the test inside the envelope.

Important directions for marking answers:

*Use black lead pencil only (No. 2 1/2 or softer).
*Do NOT use ink or ballpoint pens.
*Make heavy black marks that fill the circle completely.
*Erase cleanly any answer you wish to change.
*Make no stray marks on the answer sheet.
Form A

1. If retirement funds are taxed prior to being contributed, they generally:
   a. will not be taxed at the time of distribution
   b. will be taxed again after distribution
   c. will be distributed in a lump sum
   d. will be subject to additional federal income tax withholding

2. Excise taxes paid by the employer are determined and reported on form:
   a. 1099-R
   b. 5330
   c. W-2P
   d. W-4P

3. Periodic payments are taxed as:
   a. long term capital gains
   b. ordinary income
   c. short term capital gains
   d. excess income

4. If a member does not complete a W-4P, the withholding will be based on the assumption that the member is:
   a. married with two withholding allowances
   b. single with two withholding allowances
   c. married with three withholding allowances
   d. single with one withholding allowance

5. Taxes on a qualified total distribution:
   a. amount to 10% of the distribution
   b. are determined by completing a W-4P form
   c. are based on tables prepared by the IRS
   d. vary according to the number of withholding allowances a person has claimed.

6. All of the information on forms 1099-R and W-2P is sent to the government by the:
   a. person receiving the payments
   b. entity making the payments
   c. Social Security Administration
   d. plan member
7. Contributions that must be refunded because 401(k) tests failed are called __________ contributions.
   a. invalid
   b. early
   c. required
   d. excess

8. The important sections of forms 1099-R and W-2P include all of the following except:
   a. distribution codes
   b. taxable amount
   c. net unrealized appreciation
   d. member's tax I.D. number

9. Lump sum distributions are reported on form:
   a. W-4P
   b. W-2P
   c. 1099-R
   d. 5330

10. Fred Rollins is 69 years old. He received a lump sum payment of $10,000 from retirement funds which were contributed in 1975. When filing his tax return for 1989 this payment:
    a. can only be taxed as ordinary income
    b. may be taxed as long term capital gains
    c. may be taxed using a 5-year income averaging method
    d. will be subject to a required distribution tax

11. Form W-2P is filed with the:
    a. IRS
    b. Social Security Administration
    c. Department of Labor
    d. Treasury Department

12. The fine which is levied to the Principal for failure to file W-2P information is:
    a. $50 for each failure to file
    b. 10% of the distribution
    c. $25 per day
    d. 50% of the distribution
13. In general, withholding applies to:
   a. the entire distribution
   b. annuity payments only
   c. non-periodic payments only
   d. the taxable portion of the distribution

14. __________ contributions plus earnings are usually taxed when they are distributed.
   a. Employee
   b. Employer
   c. Optional
   d. Required

15. In general, a distribution's taxable amount from the 1099-R or W-2P is reported on line _____ of the federal tax return (1040).
   a. 1
   b. 7
   c. 10
   d. 17

16. Employee contributions to a retirement plan are usually taxed:
   a. prior to being contributed
   b. after distribution
   c. one year after distribution
   d. at the end of each year

17. The type of distribution in which all funds are not paid out in one chunk, but instead are paid out over a one year period is called a(n):
   a. lump sum distribution
   b. annuity payment
   c. qualified total distribution
   d. periodic payment

18. The type of distribution which can be taxed as a long term capital gain is a:
   a. lump sum distribution from pre-1974 funds
   b. lump sum distribution from post-1973 funds
   c. periodic payment from pre-1974 funds
   d. periodic payment from post-1973 funds
19. Barbara Wolfe received a salary of $30,000 in 1989. She also received a lump sum distribution with a taxable amount of $3,000. When filing her 1040 tax return, on line 7 she would write:
   a. $30,000  
   b. $33,000  
   c. $27,000  
   d. $3,000

20. A distribution where all the funds are paid out at once is called a(n):
   a. lump sum distribution  
   b. aggregate distribution  
   c. qualified total distribution  
   d. modified total distribution

21. Periodic payments are reported on form:
   a. 1099-R  
   b. W-2P  
   c. 1098  
   d. W-2

22. The excise tax on early distributions is paid by the:
   a. employee's tax advisor  
   b. employer  
   c. person receiving payment  
   d. entity making payment

23. An annuity payment is a type of:
   a. qualified total distribution  
   b. lump sum distribution  
   c. excess aggregate payment  
   d. periodic payment

24. The withholding for a non-periodic payment that is not a qualified total distribution will be:
   a. 5% of the distribution  
   b. 10% of the distribution  
   c. 15% of the distribution  
   d. based on tables prepared by the IRS
25. Which of the following forms is attached to an individual's 1040 tax return?
   a. W-2P  
   b. 1099-R  
   c. W-4P  
   d. 5330

26. If a member chooses not to have tax withheld from his/her distribution, the election remains in effect until he/she revokes it or:
   a. moves outside the U.S.  
   b. pays estimated taxes  
   c. completes form W-2P  
   d. retires

27. The main purpose of forms 1099-R and W-2P is to:
   a. assist the IRS in determining whether a taxpayer is reporting his or her true income  
   b. determine if the IRS must levy a fine on the entity making payment  
   c. determine if taxes were withheld from the distribution  
   d. insure that taxes are paid by February 28 of the year following the calendar year during which payments were made.

28. When earnings in a retirement plan are taxed, the tax is paid:
   a. prior to distribution  
   b. at the time of distribution  
   c. one year after distribution  
   d. at the end of each year

29. A refund of excess contributions may be subject to an excise tax of:
   a. 5%  
   b. 10%  
   c. 15%  
   d. 50%

30. Distributions that must be made by age 70 1/2 are called distributions.
   a. late  
   b. early  
   c. excess  
   d. required
31. Form 1099-R is filed with:
   a. the IRS
   b. the Social Security Administration
   c. form 5330
   d. the plan member's 1040 form
Directions

Print your name, last name first, on the appropriate place on your answer sheet. Blacken the ovals corresponding to each of the letters. Under "Identification Number", beginning in column "A", write your Social Security Number and blacken the ovals corresponding to the appropriate numbers.

Choose the best answer to each question and blacken the corresponding oval (a, b, c, or d) next to each item number on the answer sheet. There are 31 items on the test. After you have completed all of the items, put the answer sheet inside of the test and place the test inside the envelope.

Important directions for marking answers:

* Use black lead pencil only (No. 2 1/2 or softer).
* Do NOT use ink or ballpoint pens.
* Make heavy black marks that fill the circle completely.
* Erase cleanly any answer you wish to change.
* Make no stray marks on the answer sheet.
Form B

1. To qualify for a lump sum distribution, the employee must have been a plan participant for at least:
   a. two years
   b. three years
   c. five years
   d. ten years

2. A refund of excess contributions made more than 2 1/2 months after the end of the plan year is subject to the following excise tax:
   a. 5%
   b. 10%
   c. 15%
   d. 50%

3. Periodic payments are reported on form:
   a. W-4P
   b. W-2P
   c. 1099-R
   d. 5330

4. The excise tax on early distributions is:
   a. 5%
   b. 10%
   c. 15%
   d. 50%

5. The fine which is levied to the Principal for failure to file 1099-R information is:
   a. $50 for each failure to file
   b. 10% of the distribution
   c. $25 per day
   d. 50% of the distribution

6. The withholding for a non-periodic payment that is a qualified total distribution will be:
   a. 5% of the distribution
   b. 10% of the distribution
   c. 15% of the distribution
   d. based on tables prepared by the IRS
7. All of the information on forms 1099-R and W-2P must be sent to the government by:
   a. the entity who makes the payment
   b. the person who receives the payment
   c. a lawyer
   d. the employee's tax advisor

8. When employer contributions to a retirement plan are taxed, the tax is paid:
   a. prior to distribution
   b. at the time of distribution
   c. one year after distribution
   d. at the end of each year

9. The form used to determine the amount of tax to be withheld from periodic distribution payments is called the:
   a. W-2
   b. W-2P
   c. W-4
   d. W-4P

10. An annuity or other payment where all the funds are not paid out at once is called a(n):
    a. qualified total distribution
    b. periodic payment
    c. excess distribution
    d. recurrent payment

11. A refund of excess deferrals is reported on:
    a. line 7 of form 1040
    b. line 17 of form 1040
    c. form 5330
    d. form 1099-R

12. Lump sum distributions are reported on form:
    a. 1099-R
    b. W-2P
    c. 1098
    d. W-2
13. The form attached to form 1040 is:
   a. W-4P
   b. W-2P
   c. 1099-R
   d. 5330

14. Edward Olson received a non-periodic payment which is not a qualified total distribution. The taxable amount of his payment was $10,000. The amount withheld will most likely be:
   a. $ 500
   b. $1,000
   c. $2,000
   d. based on tables prepared by the IRS

15. A single distribution payment is called a(n):
   a. lump sum distribution
   b. annuity payment
   c. qualified total distribution
   d. periodic payment

16. Form W-2P is filed with:
   a. the IRS
   b. the Social Security Administration
   c. form 5330
   d. IRS Publication 505

17. In general, a distribution's taxable amount from forms 1099-R or W-2P is reported on line _______ of form _______.
   a. 7; 1040
   b. 17; 1040
   c. 7; 5330
   d. 17; 5330

18. A U.S. citizen living in Canada receives payments from his retirement plan. These payments are probably:
   a. qualified total distributions
   b. subject to withholding
   c. subject to an excise tax
   d. subject to payment of estimated taxes
19. A qualified total distribution must be paid out within what time period?
   a. six months
   b. one year
   c. two years
   d. five years

20. Distributions made before death, disability, attainment of age 59 1/2 or age 55 and separation from service are called __________ distributions.
   a. required
   b. excess
   c. early
   d. normal

21. Forms W-2P and 1099-R must be filed by what day of the year following the calendar year during which payments are made?
   a. March 15
   b. April 15
   c. May 1
   d. February 28

22. A way to figure taxes on a lump sum distribution by treating all or part of it as if the member received it in equal parts over a five year period is called:
   a. delayed capital gains
   b. tax leveling
   c. income averaging
   d. long term capital gains

23. Form 1099-R is filed with the:
   a. IRS
   b. Social Security Administration
   c. Department of Labor
   d. Treasury Department

24. Bert Miller received an annual distribution totalling $100,000 beginning at age 72. According to this information, the excise tax on this distribution would be:
   a. $10,000
   b. $15,000
   c. $20,000
   d. $50,000
25. The fine for failure to file W-2P or 1099-R information is paid by the:

   a. plan member
   b. entity making payment
   c. person who receives the payment
   d. employee's tax advisor

26. Taxes on funds in a retirement plan are usually:

   a. deferred until the funds are distributed
   b. due when the contribution is made
   c. deferred for two years after the funds are distributed
   d. deferred until the employee's normal retirement date

27. Annual distributions greater than $150,000 or lump sum distributions greater than $750,000 are called ______ distributions.

   a. aggregate
   b. excess
   c. required
   d. residual

28. Withholding generally applies to:

   a. the entire distribution
   b. only the taxable portion of the distribution
   c. the first 50% of the distribution
   d. only the employee contribution portion of the distribution

29. Periodic payments:

   a. are taxed as ordinary income
   b. may be taxed as long term capital gains
   c. are taxed the same as lump sum distributions
   d. may be taxed using a 5-year income averaging method

30. __________ contributions are not subject to tax when distributed since they were taxed prior to being contributed.

   a. Employee
   b. Employer
   c. Excess
   d. Required
31. A five year income averaging method may be used for:

a. periodic payments
b. excess aggregate payments
c. pre-1974 lump sum distribution funds
d. post-1973 lump sum distribution funds
Bill Smith is a highly compensated participant in the Ajax Company 401(k) plan. Principal does the 401(k) test for the plan year which runs from September 1, 1988 to August 31, 1989. The test fails.

It's determined that Mr. Smith has excess contributions of $1,800.00, which must be refunded. In addition, it's determined there's $200.00 of interest that must be refunded. The refund will be made within 2 1/2 months after the end of the plan year. The portion of Mr. Smith's elective deferrals which don't have to be refunded for the 1988 plan year are $4,300.00.

You need to fill in the missing tax record information on the attached pages so a correct reporting form will be produced.
TAX INFORMATION RETURNS MENU

TRANSACTION TYPE

<table>
<thead>
<tr>
<th>TRANSACTION TYPE</th>
<th>TYPE OF RETURN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - REQUEST</td>
<td>1 - 1099-A</td>
</tr>
<tr>
<td>2 - CHANGE</td>
<td>2 - 1099-B</td>
</tr>
<tr>
<td>3 - DELETE</td>
<td>3 - 1099-DIV</td>
</tr>
<tr>
<td>4 - DISPLAY</td>
<td>4 - 1099-INT</td>
</tr>
<tr>
<td>5 - REQUEST DUPLICATE</td>
<td>5 - 1099-MISC</td>
</tr>
<tr>
<td>6 - DISPLAY 1099-R AMOUNTS</td>
<td>6 - 1099-R</td>
</tr>
<tr>
<td>7 - DISPLAY LINE OF BUSINESS CODES</td>
<td>7 - 1098</td>
</tr>
<tr>
<td>8 - DISPLAY COMPANY TAX ID TABLE</td>
<td>C - W-2P</td>
</tr>
<tr>
<td>9 - DISPLAY STATE INFORMATION TABLE</td>
<td></td>
</tr>
</tbody>
</table>

TRANSACTION TYPE: 1

TYPE OF RETURN:

COMPANY TAX ID: 420127290

ORIGINAL OR CORRECTION: 0

LINE OF BUSINESS: P

PAYEE ACCOUNT NUMBER: 485681447

TAX YEAR:

STATE POSTAL ABBREV: N/A
INFORMATION RETURN
RECORD BEING ADDED

COMPANY TAX ID: 420127290
LINE OF BUS: P
TAX ID TYPE: 2  1-BUSINESS 2-INDIVIDUAL
PAYEE TAX ID: 485681447
EMPLOYER NAME: AJAX COMPANY
PAYEE NAME: BILL SMITH
PAYEE ADDRESS: 414 OAK STREET

PAYEE CITY: MIAMI
PAYEE STATE: FLORIDA  ZIP CODE: 86739

GROSS AMOUNT: TAXABLE AMOUNT:
FED TAX WITHHLD: STATE TAX WITHHLD: N/A
DISTR CODE: 5558

DISTR BOXES-
DECEASED: N/A LEGAL REP: N/A TAX AHT NOT DETER: N/A

PREFIX: 3 CONTRA8CT: 77867  SOURCE CODE: XXXX
ID: XXXX
FINISHED? X

NEXT PAYEE: X
PRINT MONTHLY? N

IS THE EMPLOYER SUBJECT TO AN EXCISE TAX? [ ] Yes  [ ] No  If so, how much? _____
## Course Objective

To gain a basic understanding:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Completely Satisfied</th>
<th>Moderately Satisfied</th>
<th>Not at all Satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic difference between various types of distributions</td>
<td>9 8 7 6</td>
<td>5 4 3 2</td>
<td>1</td>
</tr>
<tr>
<td>2. When different types of contributions and earnings are taxable</td>
<td>9 8 7 6</td>
<td>5 4 3 2</td>
<td>1</td>
</tr>
<tr>
<td>3. When withholding applies and how to determine amount withheld</td>
<td>9 8 7 6</td>
<td>5 4 3 2</td>
<td>1</td>
</tr>
<tr>
<td>4. Proper reporting form to use for distribution</td>
<td>9 8 7 6</td>
<td>5 4 3 2</td>
<td>1</td>
</tr>
<tr>
<td>5. When reporting form is sent and penalties for sending incorrect information</td>
<td>9 8 7 6</td>
<td>5 4 3 2</td>
<td>1</td>
</tr>
<tr>
<td>6. Which type of tax treatment applies to different types of distributions</td>
<td>9 8 7 6</td>
<td>5 4 3 2</td>
<td>1</td>
</tr>
<tr>
<td>7. Types of distributions subject to excise tax</td>
<td>9 8 7 6</td>
<td>5 4 3 2</td>
<td>1</td>
</tr>
</tbody>
</table>

### Comments:

**Very Good** | **Good** | **Fair** | **Poor** | **Very Poor**
---|---|---|---|---
9 8 7 6 | 5 4 3 2 | 1 |

## OVERALL RATING OF CLASS

9 8 7 6 5 4 3 2 1

### Comments:

**Very Positive** | **Somewhat Positive** | **Neither Positive Nor Negative** | **Somewhat Negative** | **Very Negative**
---|---|---|---|---
9 8 7 6 | 5 4 3 2 | 1 |

### IN YOUR OPINION, WHAT WAS THE MAJOR STRENGTH OF THIS SESSION?

### IN YOUR OPINION, WHAT WAS THE MAJOR WEAKNESS OF THIS SESSION?
APPENDIX B. COURSE OUTLINE
Good News -- Tax reporting

Bad News -- 6 other related topics

Goal -- To give those who work with the forms a better understanding of how the reporting forms fit into the big picture

1. Distribution -- Creates a taxable amount
2. Taxable amount -- Determine amount of withholding
3. Withholding
4. Reporting -- 1099-R or W-2P
5. Tax treatment
6. Member tax filing -- Form 1040
7. Excise tax -- Form 5330

**DISTRIBUTION** - Usually need a distribution before there's a need for reporting

Qualified total distribution - All funds are paid out over a 1 year period.

Lump sum distribution - All funds are paid out at once.

Periodic payment - Annuity or other payment where all the funds aren't paid out at once.

**AMOUNT TAXABLE**

Taxes on funds in a retirement plan are usually deferred until they're distributed.

This is true when dealing with employer contributions and earnings.

Employee contributions are not subject to tax when distributed since they were taxed prior to being contributed.

Basic rule would be if the funds were taxed prior to being contributed they probably won't be taxed again when they're distributed.
Most distributions are subject to federal income tax withholding, unless the member chooses not to have tax withheld.

If a member chooses no withholding, it remains in effect until he or she revokes it.

It's generally required for payments made outside the U.S.

In some cases the payment of estimated taxes may be necessary if nothing is withheld.

Withholding generally applies only to the taxable portion of the distribution.

Amount Withheld

Periodic Payments

A W-4P should be completed by the member to determine how much should be withheld.

If it's not completed, withholding will be based on the assumption that the person is married with 3 withholding allowances.

Non periodic Payments

Where it's not a qualified total distribution, it's 10% of the distribution.

If it's a qualified total distribution, it's based on tables prepared by the IRS.

IRS Publication 505 explains tax withholding and how to pay estimated taxes.
REPORTING DISTRIBUTIONS

Total or Lump Sum Distributions -- Form - 1099-R.

Periodic Payments -- Form - W-2P.

Detailed instructions for 1099-R are found combined with instructions for
Forms 1098, 5498, 1096 and W-2G.

Detailed instructions for W-2P are combined with the instructions for
the W-2.

Both are used to report the distribution to plan members or their
beneficiaries.

Main purpose of the form is to assist the IRS in determining whether a
taxpayer is reporting his or her true income.

The form must be filed with the government by the entity who make the
payment rather than the person who receives it.

1099-R is filed with the IRS.

W-2P is filed with the Social Security Administration. They furnish
information on the form to IRS.

Both must be sent to them by February 28 of the year following the
calendar year during which payments were made.

Fine (that we'd be subject to) for failure to file W-2P information is $25
per day with a maximum of $15,000 per year.

$50 penalty for each failure to file or for incorrect filings on
1099-R.

Important sections on the form:

1. Members tax I.D. # (social security #) - On the form so the IRS
can use it in their processing.

2. Taxable amount

3. Distribution codes

The reporting information can be sent to the appropriate agency on
magnetic tape, which is what we do.
**TAX TREATMENT**

Periodic payments are taxed as ordinary income.

Lump sum distributions have other tax treatment options, for awhile.

Pre-1974 funds may be taxed as long term capital gains. However, this treatment will be phased out by 1992.

Post-1973 funds are taxed as ordinary income, but in general, a 5 year income averaging method may be used.

IRS Publication 575 provides much good information about the taxation of pension income.

It's designed for people who do their own tax returns.

It explains how to report pension income on the federal tax return.

Explains tax treatment of lump sum distributions and rollovers.

**MEMBER’S TAX FILING**

In general, a distribution’s taxable amount from the 1099-R or W-2P is reported on line 17 of the federal tax return (1040).

Exception to that is refund of excess deferrals. They are added in with wages, salaries and tips and reported on line 7.

1099-R is not attached to the 1040. W-2P is.

1040 Instructions give pretty good explanation of treatment of taxable amounts.
OTHER TAXES

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Other taxes that apply are usually penalty or excise taxes.

Excise taxes apply to:

Early Distributions --

In general, distributions made before death, disability, attainment of age 59 1/2 or age 55 and separation from service. If made early tax is 10%.

Excess Distributions --

In general, annual distributions in excess of $150,000 or lump sum distributions in excess of $750,000. If distribution exceeds these limits tax is 15%.

Required Distributions --

In general, distributions that must begin by age 70 1/2. If not made when required tax is 50%.

Excess Contributions or Excess Aggregate Contributions --

Contributions that must be refunded because 401(k) or 401(m) test failed. If refund isn't made within 2 1/2 months after the plan year end tax is 10%.

Form 5330 -- Excise taxes are determined and reported on this form.

EXAMPLE

Distribution -- Refund of excess contributions $1500.00

(Made more than 2 1/2 months after the plan year end)

Earnings $90.00

Taxable Amount $1590.00

Withholding 10%

Reporting -- W-2P

Taxable Amount -- Box 10

Distribution Code 5558 -- Box 14

1040 -- Line 17

5330 -- $1500.00 x 10% = $150.00