IOSR Journal Of Humanities And Social Science (IOSR-JHSS)
Volume 21, Issue 5, Ver. 6 (May. 2016) PP 01-073
e-ISSN: 2279-0837, p-ISSN: 2279-0845.
www.iosrjournals.org

Effect of learning methods on retrieval of learned materials.

Dr Eze O. Eze Dr Benjamin N. Eze Uduchukwu D.Chika Ofoke S.Mbam Elijah S. Ikechukwu
Department of Psychology and Sociological Studies
Ebonyi State University, Abakaliki

Abstract;- *This study examined the effect of learning methods on retrieval of learned materials. A total of 60 participants were randomly drawn from SS II class in Izzi Secondary School, Ebonyi state. They are within the age range of 15 – 19 years with the mean age of 17 years. The participants were randomly assigned to groups named group A, Visual and group B, Auditory. Group A was exposed to visual aided learning method and group B was exposed to auditory learning method. A test of visual and auditory materials was administered to them. Independent group design was used and a one way analysis of variance (ANOVA) was employed to analyze the data. Visual group tended to get a higher score (M=14.37, SD=3.79), auditory group got lower score (M=9.10, SD=3.02). At the end, result indicated that visual learning method yielded a significant outcome when compared to auditory learning method. This is in view of the fact that the calculated value (34.59) is greater than the table value (4.08) at 58 df under 1 of .05 level of significance. The findings shows that learners who were exposed to visual materials tended to recall what they learned more than those exposed to auditory learning. The result was discussed in line with related literatures and recommendations were made.*

I. INTRODUCTION

Learning styles have been the subject of considerable research for many years, particularly when combined with teaching styles and how they affect student's performance. Many of such studies have concluded that student's performance improves when teaching and learning styles are compatible. But the process of learning cannot be isolated and studied independent of other variables that include intelligence, class-room environment, learning style, and motivation. Even though most individuals have learning styles they prefer and are most conducive to their processing information, it is not realistic to think that an instructor can teach in a manner that is most compatible with the individual learning style(s) of each student in the class. It is therefore prudent for students to identify their own learning style(s) and to implement classroom and study strategies that maximize their preferred mode of sensory input. An extension of maximizing the single preferred mode of sensory input is to supplement it by the use of multisensory input; that is, using learning and study strategies that include multiple modes of sensory input (visual, auditory, and tactile) that stimulate and activate multiple sites in the brain, thereby increasing attention, processing, and retention of information (Coffield, 2004).

1.1 Study Background

Students learn best by seeing the value and importance of the information presented in the classroom. If the students are not interested in the material presented, they will not learn it (Coffield, 2004). In order to achieve the ultimate goal of student learning, it is important to use a combination of teaching methods and to make the classroom environment as stimulating and interactive as possible. Students learn in many different ways. Some students are visual learners; some are auditory learners, while others are kinesthetic learners who learn by doing some task. Visual learners learn visually by means of charts, graphs, pictures, and images. Auditory learners learn by listening to lectures and reading. Students can prefer one, two, or three learning styles. Because of these different learning styles, it is important for teachers to incorporate in their curriculum activities related to each of these learning styles so that all students are able to succeed in their classes. While we use all of our senses to take in information, it seems to have preferences in how we learn best.

1.2 Storage of Information

It is imperative to understand the way that humans store information to grasp the way that humans retrieve information. According to Wittrock (1981), during "the process of learning and remembering, people organize stimuli, relate them to past experience and to schemata, elaborate their meanings, and transform their mode of presentation," and these processes "involve cognitive processes that are studied under the heading of encoding". In short, encoding refers to a strategy for storing information in long-term memory. Ormrod (2008) states that for a person to relate stimuli to past experiences and schemata, they must be aware of the relationship, that is, it must bring such experiences and schemata into the working memory to make the connection. This is not to say that experiences must happen in sequences, one after another, for the connection to happen; they may be reminded of previous experiences and schemata (Ormrod, 2008). This study seek to find out the most effective

way of learning by comparing the amount of information that Secondary School students can retain through visual and auditory learning methods. However, it also seeks to discover through various teaching methods; which is more effective in imparting knowledge on learners. More so, the problems associated with retrieval failures among Secondary School students are considered owing to their interconnections with the style of learning itself.

2.1 Review of literature

Meaningful learning occurs when knowledge stored in long-term memory is shifted to short-term memory to integrate new information into the mind (Bell-Gredler, 1986). The most important cognitive associations occur when individuals relate stored knowledge to sensory input and consequently encode the stimuli into long-term memory (that is, new schemata) (Bell-Gredler, 1986); therefore, cognitive learning emphasizes the internal mental processes of association. This concept differs from the behavioural view of association which is based upon external motivation. As Bell-Gredler (1986) states, "successful learning depends on the learner's actions rather than on events in the environment"

2.2 Attention Guide

Rieber (2004), attention involves cognitive decisions regarding which information to attend to, given the fact that the environment contains far more information than any one person can handle at any given time. Interesting pictures gain and maintain learner's attention in instructional text (Keller and Burkman, 1994). Good pictures motivate learners and encourage curiosity. Pictures including novelty and drama maintain learner's attention (Keller and Burkman, 1994). In this sense, learners can be attracted to animated visuals that include dramatic and unique effects.

One of the important roles of animation as an instructional tool is gaining students' attention (Park and Hopkins, 1993; Rieber, 1991).

Gagne, Briggs and Wager (1992) described attention as the first event of instruction. Attention correlates with students' achievement more highly than the time-to-learn and poor learners have poor attention (Mayer and Wittrock, 1996). The presentation of highly visual material is an effective teaching technique for arousing and sustaining student's attention (Hativa and Reingold, 1987).

Attention-gaining is an obvious, practical and rational use of animation. Rapidly changing visuals can be displayed on a computer screen to grab students' attention, such as cartoon figures, screen washes, and moving objects reinforcing the learning content. However, indiscriminate use of animation in computer-based instruction may hinder its positive effects on learning. Students' selective attention to animation is affected by instructional design method (Reiber, 1991).

Recent work by Deimann and Keller (2006) provide insights into factors that may address the challenges of learning in multimedia environments. These factors include cognitive overload, distractions, and navigation problems and they further provided direction for addressing these factors in conjunction with motivational theory. Specifically, they examine the role of volition and its role in self-regulation. They reported findings that may provide a basis for identifying strategies to promote self-regulation. In particular, the strategies of scaffolding and prompting have shown promise. Students who were prompted to give reasons for their selections in problem solving exercises performed significantly better than those who were not prompted (Stark, Tyroller, & Krause, as cited in Deimann & Keller, 2006). The impact of factors affecting learners' selective attention such as seductive detail (Deimann & Keller, 2006) may also guide in the design and development of effective and efficient instruction for all learners. Examining the persistence and its relationship to other motivational factors, including self-efficacy and goal orientation may also offer worthwhile directions for further research.

Vermunt (2003) provides a different framework (Figure below) to illustrate how an individual's learning style integrates four components of learning. The mental learning models and learning orientations components are considered to be relatively stable; the regulating and processing strategies are considered to be contextually determined. In this interpretation, learning style is viewed as the full range of learning activities that students usually employ: their learning orientation and their mental model of learning (Pabst, 2006).

Hayes and Birnbaum (1980) found that children's retention of information portrayed visually was consistently higher than that of auditory information. In their study, participants watched cartoons that were presented either visually, verbally, or both. After watching the cartoon, participants answered recognition questions and the result showed that children tend to focus on visual information and ignore large parts of auditory information unintentionally (Hayes & Birnbaum, 1980).

In a related study, pronounced result of visual learning superiority was found. Participants were either given a word list to read or have a researcher read to them and completed a recall test afterwards. Researchers discovered that memory accuracy was dramatically enhanced when visual study presentation was used instead of auditory presentation (Smith & Hunt, 1998). Memory errors were lower when oriented toward visual than toward auditory information, indicating that visual recollections were subjectively experienced as more distinctive than auditory recollections (Gallo & Pierce, 2011). Based on the results in the recognition test and

comprehension test, Pezdek and Stevens (1984) concluded that video material appeared to be more salient and more memorable than audio material. Moreover, under the Audio/Visual mismatch condition (audio and video tracks were not from the same television segment), memory for auditory information was reduced more than memory for video information by 25 % (Pezdek & Stevens, 1984).

Although the modality effect on visual and auditory information has been replicated several times (Hayes & Birnbaum, 1980; Pezdek & Stevens, 1984), the participants were mostly preschoolers and children under the age of 10. None of these studies have included college students as participants. Therefore, it is not clear whether the effect is only applicable to certain age groups, or whether students are more comfortable toward visual learning method.

Mark and Pashler (1992) found that the group with a study–only phase makes 10% more errors than the group with a test–study phase. In the study–only phase, participants were given Ai-Bi, where Ai was an English word and Bi was a Siberian Eskimo Yupik word. In the test study phase, participants first attempted to recall Bi given Ai as a cue then they were shown Ai-Bi pair together. This result suggests that after participants have learned something, testing their memory with mental operations helps later recall. The act of recalling instead of restudying creates new and longer lasting connection between Ai and Bi.

Another study showed that when lists are tested immediately after study, the last couple of pairs are remembered best. After a five-second delay, the recall of recently studied words diminishes. However, word pairs at the beginning of a list still show better recall. Moreover, in a longer list, the absolute number of word pairs, recall is greater but in a shorter list of word pairs, the percentage of word pairs recalled is greater.

Moga and Schneider (2001), participants were placed in forced report, free report or free report plus incentive groups. In each group, they found that the amount of correct information recalled did not differ, yet in the group where participants were given an incentive they had higher accuracy results. This means that presenting participants with an encouragement to provide correct information motivates them to be more precise. However, this is only true if the perception of that success is providing correct information. When it is believed that success is the completion, the number of responses is higher, yet its accuracy is lowered. They found that the participants that were placed in the forced response group had the lowest overall accuracy.

Cohen (1989) found that there is better recall for an action in the presence of interference if that action is physically performed during the encoding phase. It has also been found that recalling some items can interfere and inhibit the recall of other items. Another stream of thought and evidence suggests that the effects of interference on recency and primacy are relative, determined by the ratio rule (retention interval to inter item presentation distraction rate) and they exhibit time scale invariance.

Godden and Baddelly (1975) demonstrated that deep-sea divers recalled their training more effectively when trained underwater, rather than being trained on land. An academic application would be that students may perform better on exams by studying in silence, because exams are usually done in silence. Block and Ghoneim (2000) found that, relative to a matched group of healthy, non-drug-using controls, heavy marijuana use is associated with small but significant impairments in memory retrieval. Cannabis induces loss of internal control and cognitive impairment, especially impairment of attention and memory, for the duration of the intoxication period. Stimulants, such as cocaine, amphetamines or caffeine are known to improve recall in humans.

Bouton (2002) has shown that extinction is not an example of unlearning, but a new type of learning where the performance of the individual depends on the context. The renewal effect is seen when a participant is first conditioned in a context (context A) and then shows extinction in another context (B). Returning to context A may renew the conditioned response. This evidence demonstrates that appropriate responses underlying extinction may be linked to contextual information. Hence, someone who is in the context in which they initially learned the material is likely to be cued to act as they were initially conditioned to act.

Grant et al. (1998) conclude that students should take into consideration the context of testing, such as the noise level, while studying, in order to maximize their performance on both recall and recognition tasks.

Further, in cases where it is not possible to have similar learning and testing contexts, individuals who pay conscious attention to cues in the learning environment may produce better results when recalling this information. By doing so, individuals are better able to create a mental image of the original context when trying to recall information in the new testing context-allowing for improved memory retrieval. The following hypotheses were tested in the study.

Ho: There will be no statistically significant difference between visual and auditory learning methods on retrieval of learned materials. H1: There will be statistically significant difference between visual and auditory learning methods on retrieval of learned materials.

3.0 Method

3.1 Participants

A total of eighty-one (81) students volunteered themselves to participate in the experiment but only sixty (60) participants were selected irrespective of their gender through randomization from the volunteers. In this experimental study, sixty (60) participants (students) were drawn from Senior Secondary 2 class which has a

total population of one hundred and seventy-three (173) students, in Izzi Secondary School, Izzi, Ebonyi State South-Eastern Nigeria. A simple random sampling technique of blind picking (A or B) was adopted in selecting the students irrespective of their gender and placing them in two groups, namely; visual and audio. They are within the age range of 15-19 years and thirty (30) participants were assigned to the audio group while the remaining thirty (30) participants were placed to the visual group. An informed consent, which provided brief introduction to the study, was given to the participants prior to the actual experiment. Participants were given instruction for either visual or audio group depending on what group they were assigned to.

3.2 Materials/apparatus

A twenty (20) list of items comprising new words, a stopwatch, a basket, a radio set with a cassette, sheets of paper, pens, chairs, lockers and a laptop computer with the aid of Microsoft PowerPoint application program were used in the experiment. The independent variables of the study were the two learning methods namely; visual learning method and the auditory learning method. The dependent variable was the number of correct answers participants were able to recall in the test.

3.3 Procedure

The researchers provided a total of sixty small piece-sheets of paper and wrote "A", signifying "visual group" on thirty sheets and wrote "B", indicating "auditory group" on the remaining thirty sheets. After which, they neatly folded all the sheets of papers separately and mixed them up and put all inside a basket. They asked the participants to file up and walk toward the basket to pick one sheet of folded paper. The exercise was inspected thoroughly to ensure that no participant picked more than one paper. Once a participant picks a paper he/she hands it over to the experimenters, who immediately unwraps it, reads the content aloud and ask the participant to stand at a corner of the class room. Those that picked sheets of paper which had "A" written on it were asked to stand at a particular corner while those that got "B" were asked to stand at a different corner of the classroom.

During the experiment, the participants in audio group were instructed not to write anything as the lecture will be going on by a voice recorded lecture which will be played to them on the radio set. The experimenters made efforts to ensure that every writing material was removed from the participants. The auditory learners were made to listen to the voice recorded lecture which was played out to them through a radio set for fifteen 15 minutes, after which they were subjected to 5 minutes test where they were asked to list out the twenty (20) words or items they have learned from the lecture. All the writing materials for the test were provided by the experimenters and answer sheets were collected for marking after the test.

Immediately after the auditory session, the experimenters then proceeded with participants in the visual group and instructed them not to write or draw as the lecture was going on. They (visual learners) were exposed to 15 minutes lecture with the aid of a laptop computer and a power point presentation package. A 5-minute test was given to them, where they were asked to list out the twenty (20) words or items that were taught to them. Afterwards, their answer sheets were collected for marking. Each of them was scored over twenty (20), one mark (1mk) for each correct word/item. Those scores awarded to each of them served as the data obtained for analysis.

3.4 Design and statistics

The design used in this study was an independent group design. Independent group design refers to a situation in which each participant is only assigned to one condition of the independent variable. The reason why the researchers used this design was because; two groups were used with different conditions.

Statistically, Analysis of variance (one-way ANOVA) was used to analyze the data. This statistics was considered appropriate because of the sample size of 60 participants as well as to enable the researchers to determine if there were significant differences between the levels of the independent variables, namely: visual learning method and auditory learning method.

3.5 Control of extraneous variables

Windows were closed properly and movement along the corridor was strictly restricted to avoid noise and distraction. After the participants must have been ushered into the laboratory, no one else was allowed to either enter or leave during the experiment apart from the experimenters. The participants were provided with writing materials for the exercise to avoid random movements in order to borrow pen or paper.

4.0 Results

Haven analyzed the data obtained from the participants using independent group – One way ANOVA (Analyzes of Variance), the result of analysis, as solved in appendix II, can be seen in the following tables; namely; Table 1 and Table 2.

Table 1:

Descriptive table showing group mean and standard deviation.

Groups/Variables	$(\bar{x})$	**SD**
A – Visual	14.37	3.79
B – Auditory	9.10	3.02

The result, as shown in table 1 above indicates that the mean score of participants in the visual group, thus; (M=14.37, SD=3.79) did differ significantly from the mean score obtained from participants in the auditory group, thus; (M=9.10, SD=3.02). The result clearly indicates that Visual Learners retrieved learned materials better than the auditory learners.

Table 2:
ANOVA SUMMARY TABLE

Sources	**SSA**	**DFA**	**MSA**	**F**	**.05 level of sig.**
Learning Methods	416.06	1	416.06	34.59	Significant
S/A	697.67	58	12.03		
Total	**113.73**	**59**			

DFA (1, 58) P<.05 =4.08

As it is evident from table 2 above, an independent group –one way ANOVA reveals that the calculated value of 34.59 is greater than the table value of 4.08 at 58 degree of freedom (df) under 1 of .05 level of significance. Hence, F is significant. Therefore the researcher rejects the null hypothesis and accepts the alternative hypothesis which states that "there will be statistically significant difference between visual and auditory learning methods on retrieval of learned materials.

4.1 Discussion

The findings of this study indicated that visual learners tend to retrieve learned materials far better than their auditory counterparts. The research data to a very large extent supports the alternative hypothesis which states that there will be statistically significant difference between visual learning methods and auditory learning methods. Based on the above premise, the researchers did affirm that visual learning method is more effective in helping secondary students to retain and retrieve information (learned materials) than auditory learning method. Participants using visual learning method scored higher in the memory test than participants using auditory learning method, indicating that the presentation style does have an effect on retrieval of learned materials. Consistent with previous research (Hayes & Birnbaum, 1980; Smith & Hunt, 1998), our data illustrate that memory accuracy can be affected by presentation styles and people have better memory for visual information than auditory information (Pezdek & Stevens, 1984; Pierce & Gallo, 2011). Similar to Hayes and Birnbaum's study (1980), the data showed a slight trend that younger people tend to perform better under visual learning condition than under auditory learning condition. This is evident on the mean age of the participants which is 17 years; we assume that the mild difference is due to the effect of visual superiority. Visual superiority is defined as the situation that "visual stimuli tend to dominate over other modalities in both perceptual and memory tasks" (Pezdek & Stevens, 1984). Young people are assumed to be more focused on visual information and pay comparatively less attentions to auditory information (Pezdek & Stevens, 1984) and the findings did support this assumption.

Another possible explanation of visual superiority may be due to the retrieval monitoring process in our brains. Pierce and Gallo (2011) discovered that retrieval-monitoring processes are affected by the presentation modality. Based on Smith and Hunt (1998) findings, visual presentation was found to be more distinctive than auditory presentation and this difference facilitated memory discrimination, because "even though both modalities are likely to activate a phonological code (phonological coding is the ability to produce, discriminate, and manipulate the phonological (or sound) structure of a language as distinct from its meaning.

Another study agrees with the findings of this study as it revealed that additional features from visual presentation might facilitate a monitoring process that suppresses false memory" and thus, retention of visual presentation is higher than that of auditory presentation (Pierce & Gallo, 2011). In addition, superiority of visual over audio presentation in retention is found when the output of recall is written but not when it is spoken (Kellogg, 2001). Writing activates orthographic features in preparation for motor output, and these provide a useful recognition check on visually encoded information generated for recall. Thus, when compared to visual-written recall condition, retention is lower for auditory information than visual information because "only in this case are orthographic as well as phonological features are activated at recall" (Kellogg, 2001).

The study by Deimann and Keller (2006) supported the findings which provided insights into factors that may address the challenges of learning in multimedia environments. These factors include cognitive overload, distractions, and navigation problems and they further provide direction for addressing these factors in conjunction with motivational theory. In another study, Students who were prompted to give reasons for their selections in problem solving exercises performed significantly better than those who were not prompted (Stark, Tyroller, & Krause, as cited in Deimann & Keller, 2006). The impact of factors affecting learners' selective attention such as seductive detail (Deimann & Keller, 2006) may also guide in the design and development of effective and efficient instruction for all learners.

However, the present study is in keeping with Cohen (1989), who found that there is better recall for an action in the presence of interference if that action is physically performed during the encoding phase.
Findings from this study have obvious implications, first; our data illustrated that memory accuracy can be affected by presentation styles and students have better memory for visual information than auditory information (Pezdek & Stevens, 1984; Pierce & Gallon, 2011).

4.2 Limitations of the study

In the course of this study, some obstacles which limited the study were encountered. Although the present findings suggest that visual learning method is more effective in helping secondary students to retrieve information (learned materials) than auditory learning method, our understanding of the relationship between learning method and retrieval is far from being complete. For example, whether the use of visual aids, such as PowerPoint and pictures can help students to retrieve learned material is still uncertain.
Furthermore, the present study failed to consider gender of the participants which would have provided an insight into which gender under which particular learning condition or method could better retrieve learned materials. Also, age of the participants was not considered in this study as to which age range under which learning condition or method could better retrieve learned materials.

4.3 Suggestions for future research

The researchers suggests that similar studies from other researchers should be carried out in a wide scope in terms of using two or more schools in a comparative study as well as in more well equipped laboratories to enhance external validity. However, it will be interesting to explore whether gender difference has an effect on retrieval of learned materials under any kind of learning method.
Lastly, future research may also look into the effects of combining visual and auditory learning method and compare its effectiveness with other learning methods, for instance, problem-based learning (Marklin & Hancock, 2010) and kinesthetic learning method.

REFERENCES

[1] Bell-Gredler, M. E. (1986). Learning and Instruction: Theory into Practice. New York: Macmillan.
[2] Block, R.I; Ghoneim, M.M (2000) Effects of Frequent Marijuana use on Brain Tissue Volume and Composition. Neuro Report 11: 491-496.
[3] Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004). Learning Styles and Pedagogy in post-16 Learning; A Systematic and Critical Review. London: Learning and Skills Research Centre.
[4] Cohen, R.L. (1989). The Effects of Interference tasks on Recency in the free Recall of Action Events. *Psychology Research 51*: 4.
[5] Deimann, M. & Keller, J. (2006). Volitional Aspects of Multimedia Learning. *Journal of Educational Multimedia and Hypermedia. 15* (2), pp. 137-158.
[6] Gagne, R. M., Briggs, L. J. & Wager, W. W. (1992). Principles of Instructional Design. FL: Harcourt Brace Jovanovich.
[7] Godden, D. & Baddeley, A. (1975) Context Dependent Memory in two Natural Environments. *British Journal of Psychology 66*(3): 325-331.
[8] Grant, H. M.; et al. (1998). Context-Dependent Memory for Meaningful Material: Information for Students. *Applied Cognitive Psychology 12:*617-623.
[9] Hativa, N. & Reingold, A. (1987). Effects of Audio-Visual Stimuli on Learning through Micro-Computer Based Class Presentation. Instructional Science, 16 (3), 287-306.
[10] Hayes, D. S., & Birnbaum, D. W. (1980). Preschoolers' Retention of Televised Events: Is a Picture Worth a Thousand Words?. *Developmental Psychology*, 16, 410-416.
[11] Keller, J. & Burkman, E. (1994). Motivation Principles in Instructional Message Design: Principles from the Behavioural and Cognitive Science. Eaglewood Cliffs: NJ.
[12] Kellogg, R. T. (2001). Presentation Modality and Mode of Recall in Verbal False Memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 27, 913-919.
[13] Mark, C. & Pashler, H. (1992) the Influence of Retrieval on Retention. Memory and Cognition. *Psychonomic Society.*
[14] Mayer, R. E. & Wittrock, M. C. (1996). Problem-Solving Transfer. In Handbook of Educational Psychology. New York: Macmillan.
[15] Moga, N. & Schneider, W. (2001). The Role of Accuracy Motivation on Children's and Adults' Event Recall. *Journal of Experimental Child Psychology 78:* 313-329.
[16] Ormrod, J.E. (2008). *Human Learning* (5th ed.). New Jersey: Pearson Education, Inc.
[17] Pabst, MN. (2006). Learning Styles. Retrieved July 13, 2006, from Learning Styles Website: http://css.unigraz at/courses/TeLearn/SS06/Presentations/ Learning%20Styles.pdf.
[18] Pezdek, K. & Stevens, E. (1984). Children's Memory for Auditory and Visual Information on Television. Developmental Psychology, 20, 212-218.

[19] Pierce, B.H, & Gallo, D.A (2011). Encoding Modality can Affect Memory Accuracy Through Retrieval Orientation- *Journal of Experimental Psychology; Learning, Memory, and Cognition 37*, 516-521.

[20] Reiber, L. P. (1990). Animation in Computer-Based Instruction. Educational Technology Research and Development, 38 (1), 77-86.

[21] Smith, R.E, & Hunt, R.R (1998). Presentation Modality Affects False Memory. Psychonomic Bulletin & Review, 5, 710-715.

[22] Smith, R. E., & Hunt, R. R. (1998). Presentation Modality Affects False Memory. *Psychonomic Bulletin & Review, 5*, 710–715.

[23] Vermunt, J. (2003). The Power of Learning Environments and the Quality of Student Learning. In E. De Corte, L., Verschaffel, N. Entwistle & J.J.G

[24] Wittrock, M.C. (1981). Learning and Memory. In F. H. Farley & N. J. Gordon (Eds.), Psychology and Education: The State of the Union (242-264). Berkley: McCutchan Publishing Corporation.