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The Effect of Notetaking and Review Among Eighth-Grade Students

Nancy Lindbergy Risch
Utah State University

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THE EFFECTS OF NOTETAKING AND REVIEW
AMONG EIGHTH GRADE STUDENTS

by

Nancy Lindberg Risch

A thesis submitted in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE
in
Psychology

UTAH STATE UNIVERSITY
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Nancy Linberg Risch
# LIST OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ACKNOWLEDGEMENTS</td>
<td>ii</td>
</tr>
<tr>
<td></td>
<td>LIST OF TABLES</td>
<td>v</td>
</tr>
<tr>
<td></td>
<td>LIST OF FIGURES</td>
<td>vi</td>
</tr>
<tr>
<td></td>
<td>ABSTRACT</td>
<td>vii</td>
</tr>
<tr>
<td>I.</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Statement of the Problem</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Cognitive Developmental Differences Related to Notetaking</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Prior Knowledge</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Working Memory Ability</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Learning Strategies</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>External Factors Influencing Notetaking</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>9</td>
</tr>
<tr>
<td>II.</td>
<td>REVIEW OF LITERATURE</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>The Encoding and External Storage Functions of Notetaking</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Provided Notes as External Storage</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Types of Notes Provided</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Summary</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Purpose</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Objectives and Hypotheses</td>
<td>23</td>
</tr>
<tr>
<td>III.</td>
<td>METHOD</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Subjects and Design</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Materials</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Procedure</td>
<td>32</td>
</tr>
<tr>
<td>IV.</td>
<td>RESULTS</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Scoring of Notes and Recall Tests</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>Test Performance</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Notetaking Performance</td>
<td>41</td>
</tr>
<tr>
<td>V.</td>
<td>DISCUSSION</td>
<td>42</td>
</tr>
</tbody>
</table>
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Notetaking Strategy and Notetaking Format for Each of the Nine Groups</td>
<td>27</td>
</tr>
<tr>
<td>4. Number of Male and Female Participants in Each of the Nine Groups</td>
<td>46</td>
</tr>
</tbody>
</table>
**LIST OF FIGURES**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mean number of correctly recalled ideas among the nine groups on the structural recall test</td>
<td>40</td>
</tr>
<tr>
<td>2.</td>
<td>Mean number of correctly recognized facts among the nine groups on the factual recognition test</td>
<td>40</td>
</tr>
</tbody>
</table>
ABSTRACT

The Effect of Notetaking and Review
Among Eighth-Grade Students

by

Nancy Lindberg Risch, Master of Science
Utah State University, 1989

Major Professor: Dr. Kenneth A. Kiewra
Department: Psychology

A study was conducted in which both notetaking and review were systematically varied in order to examine eighth-grade student's notetaking and performance behaviors. Three formats of notes (Matrix, skeletal, conventional) were examined in combination with three notetaking strategies (take notes/review own notes, take notes/review expert notes, listen/review expert notes) to form nine conditions. Subjects viewed a videotaped lecture, reviewed their respective set of notes, and were administered the following performance tests: structured recall, factual recognition, application, and synthesis. The number of ideas, number of words, and an efficiency calculation was obtained for each notetaking protocol. Results indicated that subjects reviewing a matrix format outperformed those reviewing a
skeletal outline format on the application test, a higher-order measure. Subjects recorded an average of less than 30% of the total lecture ideas, and females recorded significantly more words and ideas than did males. Females also outperformed males on tests of structured recall and factual recognition. Speculation was that females' more complete product of notes contributed to their higher performance on the factual-ordered tests. Their performance was not significantly different from males' on the higher-ordered tests.
CHAPTER I
INTRODUCTION

Statement of the Problem

College students attending lectures commonly take notes to preserve the material for further study. Notetaking is generally advocated, because information recorded in notes has been shown to have a greater probability of being recalled than nonnoted information (Rickards & Friedman, 1978). Although there is much known about the effectiveness of notetaking, this knowledge is mainly restricted to the college population, where the bulk of the research has been conducted (Hartley & Davies, 1978). In fact, the writer's own informal review of 48 studies on notetaking revealed that all but two studies (Bretzing, Kulhavy & Caterino, 1987; Carrier & Titus, 1981) used college students as subjects. The need for notetaking, however, begins much earlier than college. According to Bretzing et al. (1987), students are generally expected to take notes as early as junior high school.

Cognitive Developmental Differences Related to Notetaking

Cognitive developmental differences exist between college and junior high-aged students that may limit the generalizability of findings with college students to junior
high school students. Three such cognitive-difference variables, which pertain to notetaking and which show developmental trends, are prior knowledge, working memory, and the use of learning strategies (Brown, Bransford, Ferrara & Campione, 1983; Kiewra, 1988).

Prior Knowledge

The knowledge one brings to a learning situation has been shown to influence learning. For example, Chi (1978) conducted a study that compared recall of chess positions among subjects with varying knowledge of chess. Results indicated that subjects with high knowledge of chess recalled many more situations than subjects low in chess knowledge. Prior knowledge facilitates learning by providing anchors that help in assimilating incoming information into preexisting knowledge structures (Brown, 1979). Prior knowledge about a lecture topic, for example, should ease the process of learning, because new knowledge can be multiply connected with previous knowledge. These multiple connections not only enhance the understanding of new material but afford various pathways to its eventual retrieval.

One way to compensate for low knowledge is by employing a learning strategy, such as notetaking, to aid in forming connections between new and previous knowledge. A recent study by Peper and Mayer (1986) deals with the relationship between prior knowledge and notetaking. The authors
predicted that learners with previous knowledge of a lecture would automatically generate connections between presented information and existing knowledge but that learners less familiar with lecture content would need additional assistance, such as notetaking, to make those connections. The authors' predictions were supported when notetakers unfamiliar with lecture content outperformed nonnotetakers also unfamiliar with lecture content on a problem-solving test. However, because notetakers often reorganized knowledge while recording notes, they did not perform as well as nonnotetakers on tests requiring verbatim learning.

In general, adults, as compared to junior high-aged youth, have knowledge bases that house more concepts, specifies more relations among concepts, and are better organized (Chi, 1978). Therefore, junior high-aged students have comparatively limited knowledge structures and they may need additional assistance in making connections. Notetaking has been shown to be most effective with low-knowledge students (Peper & Mayer, 1978), so it should especially benefit junior high-aged students.

**Working Memory Ability**

A second cognitive variable that influences notetaking is working memory. Working memory is, theoretically, the conscious mental processes performed in the human brain.
The capacity of working memory is approximately 7, plus or minus 2, units of information (Miller, 1956). Information persists in working memory without rehearsal approximately 15-20 seconds. These factors may limit learning from lectures, where ideas are fleeting. Learners must, therefore, hold lecture ideas in working memory while transcribing them. The limiting effects of working memory were described in a study by Kiewra, Benton, and Lewis (1987), who found that working-memory ability was positively correlated with notetaking behavior. Students who were less able to hold and reorganize information in working memory recorded fewer words than students with more proficient working-memory ability.

Different interpretations exist regarding why adults demonstrate larger working-memory capacity than adolescents (Dempster, 1978). One explanation (Case, 1978) is that a gradual increase occurs in the automaticity of basic operations. As operations, such as encoding information into long-term memory, become more automatic, they require less selective attention. Therefore, more capacity is available for storing and manipulating information in working memory. Experienced notetakers, for example, are likely to be more automatic at recording notes than beginning notetakers. Novices are clearly at a disadvantage in notetaking, because much of their selective attention is
consumed by the task of recording notes and less of their attention is available for comprehension of the material.

Another explanation for apparent developmental differences in working-memory ability between younger and older children relates to the use of learning strategies such as rehearsal or chunking (combining information into a shorter form that is easier to remember). For example, Dempster (1978) investigated whether children between the ages of 7 and 12 differ in their working-memory ability beyond their employment of learning strategies. Subjects learned material that was either easy or difficult to chunk. Dempster hypothesized that younger subjects exposed to the easily chunked material would display greater differences in their learning than older children, who would likely make better use of the chunking strategy. Results confirmed this hypothesis. When chunking opportunities were available, older children performed better than younger children. However, when the material was resistant to a chunking strategy, differences were not apparent. This study suggests that the use of learning strategies varies across age groups to a greater extent than does the capacity of working memory. In other words, what appear to be differences in working memory are really strategic differences.
Learning Strategies

The use of learning strategies, therefore, is a third variable in differences in notetaking between adults and adolescents. Strategies encompass a diverse range of activities that a person voluntarily employs in order to assist learning. Examples include rehearsing material to keep it active in working memory, underlining key ideas, reorganizing information so that related ideas are stored together, attempting to remember a particular event by recalling associated people and events, and, of course, taking notes to facilitate encoding and/or to provide external storage of the information (DiVesta & Gray, 1972).

Although notetaking is an important strategy for enhancing learning (Kiewra, 1985a), up until junior high school students probably have limited exposure to situations requiring notetaking and may, therefore, have limited knowledge about strategies for effective notetaking. Because of this limited exposure, junior high-aged students are expected to record less adequate notes than college students. In fact, it has been shown that junior high school students, as compared to college students, have trouble selecting important subordinate idea units to record in their notes. Instead, they generally capture only those idea units that are the most superordinate. For example, Brown and Smiley (1977) examined the differences among
college students, seventh graders, and fifth graders in their abilities to rate, from 1-4, informational units in a passage as to their importance to the overall theme of the passage. College students were able to distinguish all four levels. Seventh graders could differentiate only the highest and lowest levels, and fifth graders were able to pick out only the highest level. The rating data suggest a developmental trend in which students gradually become more adept at selecting out ideas of differing importance. Sensitivity to relative importance of lecture ideas may be crucial in effective notetaking, which requires the selection and transcription of both main ideas and subordinate ideas in order to maximize test performance (Kiewra & Fletcher, 1984).

The importance of strategies for learning is more evident when one considers that seventh graders who employ effective strategies are able to recall as much as college students (Brown et al., 1983). Brown et al. also report that during junior and senior high school, students develop and fine tune strategies for learning but that sometimes the strategies they fine tune are inferior ones. Although capable of improving their performances, younger adolescents may be unaware of the more beneficial strategies for enhancing learning and, therefore, are restricted to improving nonfunctional strategies. It seems, therefore, that developmental differences in strategy employment are
influenced by students' awareness of the importance of strategies and of explicit knowledge governing when and how to use strategies. This is called conditional knowledge, because it conveys the conditions under which particular strategies should aid learning (Paris, Lipson & Wixon, 1983).

External Factors Influencing Notetaking

In addition to individual cognitive differences, notetaking strategies may also be influenced by factors, such as course characteristics, that are external to the learner. For example, strategy use may increase as course demands increase from junior high school to college. Not only does the demand for strategies increase, but the types of strategies deemed effective also seem to vary with course characteristics (Rohwer, 1986). A study by Thomas (1987) also confirms this notion. He found that the nature of students' study activities was directly related to course demands.

Several of the course factors that may effect notetaking were specified by Kiewra et al. (1987). These include the rate and density of the lecture and the organization of the presentation. It is likely that such factors vary between junior high school courses to college
courses and thereby encourage, if not demand, more extensive and appropriate strategy use.

Summary

In summary, research generally supports the notion that junior high school students differ from college students in important cognitive variables (prior knowledge, working memory, and strategies) that may contribute to notetaking behavior. A large proportion of the developmental differences between children and adults stems from the increasingly strategic nature of the older students' study habits (Brown, 1979), and this increase may be due to demands from the older students' courses for more effective strategies. Hence, results from notetaking studies using adults as subjects may not be generalizable to the junior high school population.

The two notetaking studies reviewed by this author that did incorporate junior or senior high school students both attempted to pretrain their subjects in notetaking strategies (Bretzing et al., 1987; Carrier & Titus, 1981). However, the results on performance of the pretraining were nonsignificant or minimal. With respect to actual notetaking behaviors, only the study of Carrier and Titus (1981) analyzed subjects' notes and found that the students had recorded an average of 27% of the total lecture ideas.
Because pretraining junior high students in notetaking has been unsuccessful and because junior high students' untrained notetaking behavior has not been clarified, there is a need to examine junior high students' conventional notes and also to indirectly manipulate their notetaking in ways that might provide useful implications for teachers.
CHAPTER II
REVIEW OF LITERATURE

Although notetaking of junior and senior high school students has not been well investigated, considerable research has been conducted with college-aged students. This review will focus on various aspects of that research by describing notetaking functions and limitations and suggesting possible alternatives to traditional notetaking that may be appropriate for junior high school students.

The Encoding and External Storage Functions of Notetaking

Notetaking can theoretically serve two functions: encoding and external storage (DiVesta & Gray, 1972). The encoding function, also known as the process function, is the actual activity of taking notes and is advantageous because it helps transfer lecture material into long-term memory. Assessment of this function involves comparing the test performances of subjects who have taken notes with subjects who have been forbidden to take notes (while controlling for review). Several such studies have resulted in support for the process function of notetaking (e.g., Burnett, DiVesta & Rogozinski, 1981; Bretzing et al., 1987; Fisher & Harris, 1973; Hult, Cohn & Potter, 1984; Maqsud,
1980; Rickards & Friedman, 1978; Riley & Dyer, 1979; Santa, Lindsay & Santa, 1979). However, a critical review by Kiewra et al. (1987) has indicated that the research investigating the encoding function is equivocal. When students are deficient in working-memory ability and/or when lecture rates are rapid, the process of notetaking may actually be debilitating (Kiewra & Benton, 1985; Peters, 1972).

The external-storage function, also known as the product function, is not the recording of notes but the review of notes. The benefit of notetaking is that a product is stored outside of memory and is available for review. Assessment of this function involves comparing the performances of those who have reviewed lecture notes with those who have been forbidden to review. Research generally supports the external-storage function of notetaking (e.g., Fisher & Harris, 1973; Hartley & Marshall, 1974; Kroeker & Kardash, 1988; Kiewra, 1985b; Kiewra, DuBois, McShane & Christian, 1988; Rickards & Friedman, 1978).

According to a review by Kiewra (1985c), several studies have compared the encoding and external-storage functions of notetaking and have found the storage function to be the most important (Fisher & Harris, 1973; Kiewra, 1974; Rickards & Friedman, 1978). Therefore, reviewing notes has a greater effect on performance than recording them.
Although the storage function is prominent, in order to optimize this function a rather complete recording of the lecture is necessary. For example, Kiewra and his associates (Kiewra, 1985d; Kiewra et al., 1987; Kiewra & Fletcher, 1984) have found that the numbers of words and ideas contained in their subjects' notes are positively and significantly correlated with performance when notes are reviewed. Kiewra (1983a) also conducted a study in which the quantity of notes taken and reviewed by undergraduate educational psychology students was assessed over a 4-week period. He found a high and significant correlation between the quantity of notes taken and performance on a subsequent course examination. Therefore, the effectiveness of note-taking depends on the amount of notes available for review. Unfortunately, students' notes are generally incomplete when compared with the actual ideas expressed in lectures. It is reported, in fact, that students generally record less than 50% of the critical ideas presented in lectures (Kiewra et al., 1987).

With respect to the amount of notes students take, an area that has seldom been reported is the difference in note-taking behavior between males and females. According to a review by Hartley and Davies (1978), those studies that have reported gender differences have generally indicated that females take more complete notes than males but do not perform better on subsequent tests. A study by Fisher and
Harris (1973), however, reported that females did achieve significantly higher recall scores than males. Unfortunately, those authors did not report whether females had more ideas in their notes. Therefore, reports of gender differences in notetaking and performance tend to be contradictory and inconclusive.

Provided Notes as External Storage

Because students generally take incomplete notes, their notes available for review are usually inadequate. Both Rickards and Friedman (1978) and Hartley and Davies (1978) have demonstrated that information not recorded in notes has less probability of being recalled than does recorded information. Similarly, Hult et al. (1984) found that as test item difficulty increased, the probability of students correctly recognizing a test item decreased when related lecture information was absent from notes. Therefore, in order for the external-storage function to be optimal, an adequate set of notes from which to review seems necessary. However, as previously mentioned, students are poor notetakers. One plausible solution for improving the external-storage function of notetaking would be to improve students' notetaking skills. Unfortunately, students are rarely taught effective notetaking strategies (Kiewra, 1985d), and attempts to train notetaking have not been successful
Because students are poor notetakers and training options are unfounded, an alternative solution would be to provide notes for students to study. In fact, research has indicated that reviewing instructor-provided notes is more beneficial than reviewing personally recorded notes. For example, Kiewra (1985c) found no significant differences between notetakers and listeners on an immediate factual and higher-order exam (prior to review). He did, however, find a significant difference in factual performance on the delayed exam, favoring the listeners who reviewed a set of instructor's notes over notetakers who reviewed their own notes. Kiewra attributed the differences in delayed performance to the breadth of the instructor's notes relative to the notetakers' personal notes. In fact, in another study, Kiewra (1985d) found that students who were absent from a lecture but who reviewed lecture notes provided by the instructor actually outperformed students who took and reviewed their own notes. Analyses of the instructor-provided notes and the student notes once again revealed that the instructor's notes were more detailed and better organized than were the students' notes.

Although research has verified that reviewing the instructor's notes is more effective than reviewing one's own notes, it has also been found that reviewing both sets
of notes is best of all. For example, Maqsud (1980) conducted a study in which subjects were allowed to review their own notes, their own plus a set provided by the instructor, or just the instructor's notes. Subjects having both their own notes and the instructor's notes performed best, followed by subjects who reviewed only the instructor's notes, followed by those who reviewed their own notes. In a similar study, Kiewra (1985e) found a trend indicating that achievement is highest when subjects have an opportunity to review the instructor's notes plus their own notes rather than reviewing one or the other. The aforementioned studies advocate the use of the instructor's notes to aid students in processing the lecture material by assuring that they have complete and organized notes to review. A further issue concerns the optimal format of notes provided for review.

Types of Notes Provided

Various forms of provided notes or frameworks for notetaking have been investigated. With respect to provided notes, Kiewra and several associates (Kiewra, DuBois, Christian & McShane, 1988) compared the performance of three groups who listened to a lecture without taking notes and who were subsequently provided with one of three different forms of study notes, which were equated in the number of idea units expressed: a full, verbatim text; a comprehensive
linear outline; or a completed matrix. The matrix was a two-dimensional device that included categories of information along one axis and information relevant to those headings within the intersecting cells. Each group had 25 minutes to review their respective notes. Results indicated that the matrix and outline groups recalled significantly more than the full text group and that the matrix group synthesized significantly more lecture concepts than the full text group. These findings suggest that provided notes that are well organized are more helpful for review than are verbatim lecture notes. The more organized notes offer the advantages of having the key ideas selected out and having specified the relations among the ideas.

Realistically, however, few instructors are willing to provide complete lecture notes for students. There is, however, a workable middle ground. That is, the provision of some sort of framework for notetaking that may facilitate the process of notetaking and thereby result in a more complete product of notes for review. Research has looked at two basic kinds of frameworks for notetaking: skeletal outlines and matrix frameworks. A skeletal outline is a linear outline of the lecture with spaces provided for notetaking. An advantage of skeletal notes over personal (or conventional) notes is that lecture headings are provided that may cue notetaking and ultimately produce a more organized and complete product for review.
Essentially, using the skeletal outline can enhance both the process and product functions of notetaking (Carrier & Titus, 1979).

Taking notes on an instructor-provided matrix framework should logically provide similar benefits. The matrix framework provides the headings but leaves the information cells blank for notetaking. Theoretically, the matrix framework offers many advantages for notetaking. It provides cues for notetaking and, when completed, may result in an organized product for review. Because of its spatial (multidimensional) structure, the matrix encourages relevant comparisons and contrasts of recorded lecture ideas both within and across categories of information. The skeletal outline, because of its linear structure, fails to accent relationships across categories of information. The matrix is also likely to serve an effective retrieval cue function, such that one idea may lead to the recall of several ideas that are spatially related (Kiewra, DuBois, Meyerhoffer, Roskelley, McShane & Christian, 1988). In addition, the activity of filling in cells of a matrix is an organizational learning strategy that involves linking important supporting details with main ideas. This requires deeper processing than does recording notes sequentially, because fleeting lecture ideas must be comprehended to some degree if they are to be sorted into established categories. Because deeper processing is associated with increased
recall (Craik & Lockhart, 1972), matrix notetaking should be facilitative.

Several studies have investigated the effects of providing different types of notetaking frameworks for students. One study compared the encoding and external-storage effects involved in matrix notetaking, skeletal notetaking, and personal notetaking (Kiewra, DuBois, McShane & Christian, 1988). Results indicated that none of the notetaking groups performed better on immediate tests without review than a group that only listened. However, all of the notetaking systems served an external-storage benefit, favoring those who had taken and reviewed notes over those who had neither taken nor reviewed notes. Overall, the matrix and skeletal notetakers tended to outperform the personal notetakers on performance tests. Analyses of the recorded notes revealed that notes recorded on matrix and skeletal frameworks included more ideas and were more efficient (used fewer words to express an idea) than the personally recorded notes.

The benefit of matrix and skeletal notes may be especially important for students with limited working-memory ability. For example, Kiewra and Benton (1985) found that students less able to hold and manipulate information in working memory recorded fewer words and ideas in their notes. Because skeletal outlines and matrices provide a number of lecture headings, they enable learners to write
less to convey an idea, which should theoretically free up their working memories to process additional incoming information. Therefore, one would speculate that students, normally limited to their ability to take extensive notes, might be more likely to produce a complete set of notes from which to review if they were provided with a matrix or skeletal outline for notetaking.

Research has also examined the effects of deeper processing at review via reorganization of information into provided frameworks. For example, in a study by Kiewra (1983b), all subjects received copies of the instructor's notes, and half of them were told to review as they desired; whereas the others were instructed to review by reclassifying information from the provided notes into a matrix. Results indicated that those who completed the matrix achieved more on a delayed free-recall exam than those in the unstructured review group. The author speculated that reorganizing ideas onto the matrix involved deeper processing and, therefore, enhanced learning.

Last, researchers have investigated the effects of reviewing notes that are less than ideal, which is often the case when students miss a lecture and borrow lecture notes from a classmate. Kiewra and his associates (Kiewra, DuBois, Meyerhoffer, Roskelley, McShane & Christian, 1988) examined the effects of students reviewing one of three different types of borrowed notes (conventional, skeletal or
matrix) in order to determine the optimal type of borrowed notes to review. Results indicated that matrix-note borrowers tended to achieve higher than those in the other note-borrowing groups. This study lends additional support to the idea that increased organization enhances recall. The authors speculated that the results may be even more significant when lecture information is originally presented in a less organized fashion.

Summary

The most important function of notetaking is that it produces a product from which to review. It has been established that students are generally poor notetakers; therefore, they often have an incomplete product to study. One way to compensate for inadequate notetaking is to provide students with complete instructor's notes to review. Realistically, however, not many instructors are willing to give students complete transcripts of their lectures. An alternative means for improving notes is to provide students with an aid, such as a skeletal outline or a matrix framework, that can assist notetaking organization and cue students as to which ideas are most important to record. Junior high students may especially benefit from structured notetaking aids because they generally have had little or no training in notetaking and have been shown to have
difficulty distinguishing levels of varying importance among lecture ideas.

Effective notetaking is a function of particular cognitive factors (working memory, prior knowledge, and strategies) that progress developmentally; therefore, research using college students may not be generalizable to the junior high school population. In addition, course factors that might influence notetaking are likely to differ between junior high and college classes. Therefore, more research is needed to determine actual notetaking behaviors of junior high school students and to determine the effects of provided notetaking-aids on notetaking and performance with junior high school students.

The literature is inconclusive with respect to notetaking and performance differences between males and females. The few studies that have reported such differences generally concur that females tend to take more complete notes than males. Previous research has indicated that more notetaking ideas is correlated with greater performance (Kiewra et al., 1987). However, it is unclear whether females outperform males on tests when they have taken more notes. Therefore, more research is needed to determine whether gender differences exist for the amount of notes junior high students record and whether there are subsequent performance differences between males and females.
Purpose

The study investigated notetaking behaviors among junior high school students who recorded notes on a skeletal outline, a matrix framework, or in a conventional, unaided manner. The effects of reviewing these notes relative to reviewing expert sets of notes was also determined.

Objectives and Hypotheses

The objectives and hypotheses of this study were:

1. To investigate the quantity (number of recorded ideas) of notes that students record at the junior high school level. College students have been shown to take incomplete notes. Because junior high students are less advanced than college students in cognitive variables that might affect notetaking, junior high school students' notetaking behaviors are expected to be quite incomplete (perhaps at a level below 40%).

2. To investigate performance on tests of recall, factual recognition, application, and synthesis among groups reviewing conventional notes, notes recorded on skeletal outline, and notes recorded within a matrix framework. It was hypothesized that performance on the synthesis test would favor the matrix reviewers, because relations among ideas are more readily apparent than with the other forms of notes. Also, because the matrix may serve a retrieval-cue
function such that one idea leads to the recall of several spatially related ideas, performance on the recall test was hypothesized to favor students reviewing the matrix.

1. To investigate performance on tests of recall, factual recognition, application, and synthesis among groups recording notes conventionally, on a skeletal outline, or within a matrix. Because matrix and skeletal outline notetaking requires deeper processing via reorganization, it was hypothesized that performance on all tests would favor matrix and skeletal outline notetakers over conventional notetakers.

4. To investigate performance on tests of recall, factual recognition, application, and synthesis among groups who take and review their own notes, take notes and review a provided set of expert notes, or listen and review a set of expert notes. It was hypothesized that taking notes and reviewing an expert set of notes would result in the highest performance on all tests, because the process of notetaking encourages personal encoding; whereas the provision of expert notes, which are complete, offers excellent storage benefits. It was hypothesized that subjects who listen and review expert notes would outperform those who record notes and review their own transcriptions. This is because the storage function has proven to be more important than the encoding function of notetaking. This should be especially apparent among junior high school students who are
inexperienced notetakers and are therefore expected to take incomplete notes.

5. To investigate interaction effects among the independent variable of notetaking strategy (take and review own, take and review expert, listen and review expert) and notetaking format (conventional, skeletal, matrix) on the dependent measures (recall, factual recognition, application, and synthesis tests). It was hypothesized that the optimal combination of strategy and format is to take notes on a matrix and to review expert matrix notes. That would allow personal encoding at a deeper level of processing than recording conventional notes, and it would allow the review of complete notes, which are well organized to show relations within and across categories visually. In addition, the matrix would likely serve a retrieval cue function that would aid recall.

6. To investigate possible gender differences with respect to the quantity of notes and subsequent performance on tests of recall, factual recognition, application, and synthesis. It was hypothesized that female subjects would record more ideas and perform better on tests, due to the external storage function of having more complete notes for review.
CHAPTER III
METHOD

Subjects and Design

Eighty-six students, enrolled in 4 sections of eighth-grade English at Valley City Public School in North Dakota, participated as subjects. In each of the 4 sections, subjects were randomly assigned to 1 of 9 experimental conditions. Two independent variables, each with 3 levels, formed the 9 conditions. Notetaking format was one variable, consisting of the following levels: conventional, skeletal, and matrix notetaking. The second independent variable, notetaking strategy, consisted of the following levels: take notes and review own notes (T/RO), take notes and review expert notes (T/RE), listen and review expert notes (L/RE). The design, therefore, was a 3 x 3 factorial design. Specific assignments for the 9 experimental groups appear in Table 1. The dependent variables were scores on the recall test, factual recognition test, application test, synthesis test, and both the number of ideas and words recorded in notes. An efficiency index was also calculated for each set of notes, in which the number of words recorded was divided by the number of idea units. This calculation provided an estimate of the average number of words it took to express an idea.
Table 1

Notetaking Strategy and Notetaking Format for Each of the Nine Groups

<table>
<thead>
<tr>
<th>Notetaking Format</th>
<th>Take/Rev Own</th>
<th>Take/Rev Exp</th>
<th>Lis/Rev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional (Con)</td>
<td>T/RO-Con</td>
<td>T/RE-Con</td>
<td>L/RE-Con</td>
</tr>
<tr>
<td>Skeletal (SKl)</td>
<td>T/RO-Skl</td>
<td>T/RE-Skl</td>
<td>L/RE-Skl</td>
</tr>
<tr>
<td>Matrix (Mat)</td>
<td>T/RO-Mat</td>
<td>T/RE-Mat</td>
<td>L/RE-Mat</td>
</tr>
</tbody>
</table>

Materials

Experimental materials included a videotaped lecture, blank lined paper for conventional notetaking, skeletal, and matrix frameworks for notetaking, three different forms of completed expert notes (conventional, skeletal, and matrix), and the four tests: recall, factual recognition, application, and synthesis.

The 18-minute videotaped lecture, which was shown on a 19-inch color television monitor, described four psychological approaches for understanding the human personality: behavioral, psychoanalytic, gestalt, and humanistic. The lecture addressed the following subtopics for each psychological approach: Where/When the Theory
Developed, Major Founder(s), How/Why the Theory Developed, Early Influences, The Major Focus of Theory, Other Characteristics, and Explanations of Treatment. The order of presentation of the subtopics during the lecture varied for each psychological approach. The lecture content was derived from several high school psychology texts. It was designed to be at a difficult level for eighth-grade students so that there would be a range of performance scores among subjects. The lecture contained 1883 words, 111 critical idea units, and was presented at a rate of approximately 100 words per minute. An idea unit was defined as having only one subject and possibly including descriptive words as modifiers. Each unit expressed one complete thought or stated a condition of time or place. Several idea units were identified collectively by two experimenters to establish consistent selecting methods. The experimenters then counted idea units for several paragraphs separately and compared their units for reliability. The experimenters had distinguished the same 20 ideas as separate units. They identified the remaining units collectively and constructed a key that listed them under their appropriate lecture subheadings (the first 26 idea units appear in Appendix A).

The skeletal outline framework for notetaking contained four linear headings stating the psychological approaches, and seven linear subheadings stating the aforementioned subtopics to be addressed under each approach (see Appendix
B). The subheadings were listed in the same order for each psychological approach. Ample space was provided between the headings and subheadings to permit complete notetaking.

The matrix framework was a two-dimensional device that contained the headings for the psychological approaches along the horizontal axis and the seven subtopics of those approaches along the vertical axis. The matrix was typed on one 289 x 43 cm sheet of paper (see Appendix C for condensed version). Ample space was available within the intersecting cells that complete notes could be recorded. The completed matrix allowed comparisons of lecture ideas both vertically and horizontally.

The three forms of expert notes followed conventional, skeletal, and matrix formats; and each type of expert notes contained all 111 critical lecture ideas written in phrases rather than complete sentences. The conventional expert notes contained all the critical lecture ideas in the same linear sequence as occurring in the lecture. The expert skeletal outline contained all critical lecture ideas reorganized beneath appropriate headings/subheadings, and the expert matrix notes included all critical ideas from the lecture reorganized into intersecting cells. Therefore, the ideas from skeletal and matrix expert notes did not sequentially follow the lecture but were reorganized according to appropriate subtopics that were not always
presented in the same order during the lecture (see Appendices D-F for the expert notes).

Four different performance tests were administered in the following order: structured recall, synthesis, application, and factual recognition (see Appendices G-J). This particular order of testing was chosen so that the least amount of information from earlier tests was available to provide cues for subsequent tests.

The structured recall test consisted of nine items, each requesting information from one of the subheadings of the lecture. Subjects were instructed to tie each response to one of the four psychological approaches. For example, one question asked them to state the major focus of each theory of psychology. In order to assure that the test covered a representative sample of the lecture content, questions were drawn from different cells of the completed matrix. The questions were constructed so that similar amounts of information were assessed from each psychological approach and each subheading.

The synthesis test included 12 items asking subjects to name the two psychological approaches that share a common characteristic (e.g., "Which two approaches support the idea that humans have the ability to choose their own destiny?"). The lecture did not specify any of the common characteristics. Instead, students had to form the connections between ideas on their own. Questions were
constructed so as to sample ideas from the various headings and subheadings. Split-half reliability was computed as a measure of internal consistency, and the results indicated a coefficient of .59 when the Spearman-Brown correction for length was used.

The application test consisted of 20 items. Each item provided a novel example of one of the psychological approaches (e.g., "Mr. Kent described for his therapist the details of an unusual nightmare he had last night."). Subjects were instructed to provide the psychological approach that most closely represented the example. Five test items were drawn from each psychological approach, and the items reflected content from the "Explanations of Treatment" subheading. Computed split-half reliability with the Spearman-Brown correction was approximately .77.

The factual recognition test consisted of 20 items. For each statement given (e.g., "It is believed that we are ruled by unconscious forces.")), subjects were instructed to provide the corresponding psychological approach. Five test items were constructed for each psychological approach, and the subheadings were sampled representatively as well. Split-half reliability with the Spearman-Brown correction was computed, and the results indicated a coefficient of .90.

Each test was reviewed by an Educational Psychologist to ensure that each actually assessed the type of learning
it proported to measure. In addition, the Educational Psychologist helped to eliminate cues within the tests that might "give away" correct answers.

Procedure

The experiment was conducted over two sessions exactly two days apart with all subjects attending both sessions. The study was run during four sections of English in the regular classroom, therefore, four smaller group viewings rather than one mass viewing occurred. This was appropriate so that the researcher could assure that subjects understood and followed the instructions and so that all the subjects were able to view the video monitor closely.

Subjects in each section were randomly given packets of materials with code letters assigning them to particular experimental conditions. The packets were handed out across rows such that each participant had an equal probability of being assigned to a particular condition. Subjects were instructed to keep their packets closed until told to open them. Verbal instructions informed all subjects that they would view an 18-minute lecture and have an opportunity to review a set of notes for 10 minutes immediately following the lecture and for 10 minutes prior to taking some tests in two days (no specifications were made about types of tests). The experimenter verbally informed the subjects that they would be performing different activities and that they
should only be concerned with what they have been specifically instructed to do.

Following the general instructions, subjects were verbally given the specific instructions corresponding with their particular experimental condition. Two experimenters were present during the experiment. One gave verbal instructions to the matrix notetakers and listeners, while the other verbally instructed the skeletal notetakers and conventional notetakers. Subjects in two groups (T/RO-Mat, T/IE-Mat) were instructed to take notes on the matrix framework. Those subjects were instructed to fill in the appropriate cells corresponding to the matrix headings. They were informed that the lecture would not follow the same sequence for each psychological approach, so they would need to pay attention to key words in the lecture relating to the subheadings. They were advised to use small hardwriting. Subjects in two groups (T/RO-Skl, T/RE-Skl) were instructed to take notes on the skeletal outline framework. Those subjects were instructed to take notes beneath the appropriate headings corresponding to the major ideas of the lecture and to listen for key words to know where the ideas should be placed because the lecture would not follow the same sequence for each major topic. Subjects in two groups (T/RO-Con, T/RE-Con) were instructed to take notes in their preferred conventional fashion on provided lined paper. Finally, subjects in three groups (L/RE-Mat,
L/RE-Skl, L/RE-Con) were instructed to listen to the lecture and to not take notes. Nonnotetaking subjects were informed that notes would be provided for them to review. Notetaking subjects were not informed that half of them would be provided with notes for review rather than allowed to review their own notes. This was done in order to keep the process function of notetaking consistent for all groups that took notes.

After instructions were given, the experimenter asked for questions and made clarifications. Then subjects viewed the videotaped lecture. Immediately following the lecture, subjects reviewed for a period of 10 minutes, using either notes they just took or a provided set of expert notes. Subjects in three groups (T/RO-Mat, T/RO-Skl, T/RO-Con) reviewed their own notes, while subjects in six groups (T/RE-Mat, T/RE-Skl, T/RE-Con, L/RE-Mat. L/RE-Skl, L/RE-Con) reviewed the appropriate format of expert notes that was given to them in their packet. Following the review period on the first day, subjects returned their notes to their packets, which were then collected. Students were asked not to discuss the experiment.

Two days later, during the same English period, packets were returned to each subject. Subjects were instructed to take out the same notes they reviewed before and to spend 10 more minutes reviewing them before taking a series of tests.
Following this second review period, tests were administered in the following order (with associated time constraints): structured recall (13 min.), synthesis (5 min.), application (7 min.), and factual recognition (5 min.). Prior to the administration of each test, subjects were informed of the time limit and were told to work only on the test being administered. Test directions were read aloud and the examiner responded to questions. Subjects were permitted to raise their hands if they had questions during the tests. Both experimenters circulated around the room to be certain students were working on the appropriate test and to answer questions.

Following testing, all materials were collected and subjects were debriefed by the researcher and thanked for their participation.
Two independent raters assessed the total number of words and total critical ideas for notetaking protocols. A key was constructed that included each idea unit in the lecture. This key was followed for the scoring of notes such that each idea unit found in notetaking protocols was awarded one point. All proper names (both first and last names or just last names) were scored as one idea unit and were counted as a single word. The two raters scored 10 sets of notes collectively; each then scored a second 10 sets of notes separately. Scores from this subset were compared to establish interrater reliability. For the 10 sets of notes, the number of agreements was 240 idea units and the number of agreements plus the number of disagreements of idea units totaled 253. Therefore, 95% agreement was achieved for the scoring of notes. The initial disagreements were settled by consensus and the remaining notes were scored independently by the raters.

The structured recall tests were scored similarly to the notes. The same raters followed a scoring key that listed all acceptable idea units that could be given credit for each question. Each idea unit was awarded one point and
each question was worth more than one point. For example, question #2, which states: "List one major founder for each theory", is worth four total points. In order to obtain all four points, the major founders had to be tied to their respective theories. Using the same procedure described for notetaking, scoring reliability for the recall tests was also above 90%. Ideas that initially were not agreed upon by the two raters were settled by consensus. Following the check for reliability, the remaining tests were scored independently by the raters.

Test Performance

To determine the main and interactive effects of notetaking format (matrix, skeletal, conventional), notetaking strategy (take/review own, take/review expert, listen/review expert), and gender (male, female) separate 3 x 3 x 2 ANOVAs were conducted on structured recall, factual recognition, application, and synthesis scores. The ANOVA for structured recall performance indicated a significant main effect for gender, $F (1, 67) = 11.78, p < .002, MSe = 22.50$, where females recalled more idea units than males ($M = 8.27, 4.51$, respectively). There were no other main or interactive effects.

The ANOVA for factual recognition performance also indicated a significant main effect for gender, $F (1, 67) = 5.81, p < .02, MSe = 11.07$. Once again females outperformed
males (M = 10.22, 8.37, respectively). There were no other main or interactive effects.

The ANOVA for application performance indicated that there was a significant main effect for notetaking format, F (2, 67) = 3.24, p < 0.46, MSe = 15.22. Fisher LSD tests conducted to follow up this main effect indicated that subjects who reviewed a matrix format (M = 9.51) scored higher on the application test than those who reviewed a skeletal format (M = 6.88). Scores from subjects who reviewed conventional notes fell in between (M = 8.07). Although the main effect for gender was not significant, F (1, 67) = 3.27, p < 0.76, MSe = 15.22, the means appear to be descriptively different and the apparent difference is similar to those found with structured recall and factual recognition scores (M = 8.87, 7.34 for females and males, respectively). There were no other main or interactive effects.

The ANOVA for synthesis performance yielded no main nor interactive effects.

Although the notetaking strategy by notetaking format interactions were not significant, the results approached significance for recall scores F (4, 67) = 2.19, p < .079, MSe = 22.50, and for factual recognition scores, F (4, 67) = 2.20, p < 0.79, MSe = 11.07. Tables 2 and 3 present the means and standard deviations for the respective interactions, and Figures 1 and 2 provide visual descriptions.
In both instances, those reviewing a form of matrix notes performed well if they first recorded notes on a matrix, but poorly if they had listened to the lecture without notetaking. The pattern did not hold for the conventional notes and actually showed the opposite pattern for the skeletal notes.

Table 2
Means and Standard Deviations for the Nine Groups on the Recall Test

<table>
<thead>
<tr>
<th>Notetaking Strategy</th>
<th>Notetaking Format</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take/Review</td>
<td>Matrix</td>
<td>9.38</td>
<td>1.53</td>
<td>4.63</td>
<td>1.53</td>
<td>4.61</td>
<td>1.90</td>
</tr>
<tr>
<td>Take/Review</td>
<td>Skeletal</td>
<td>9.10</td>
<td>1.50</td>
<td>5.58</td>
<td>1.59</td>
<td>8.11</td>
<td>1.90</td>
</tr>
<tr>
<td>Listen/Review</td>
<td>Conventional</td>
<td>4.10</td>
<td>1.50</td>
<td>7.33</td>
<td>1.59</td>
<td>4.67</td>
<td>1.68</td>
</tr>
</tbody>
</table>

Table 3
Means and Standard Deviations for the Nine Groups on the Factual Recognition Test

<table>
<thead>
<tr>
<th>Notetaking Strategy</th>
<th>Notetaking Format</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take/Review</td>
<td>Matrix</td>
<td>10.96</td>
<td>1.07</td>
<td>8.75</td>
<td>1.07</td>
<td>7.79</td>
<td>1.33</td>
</tr>
<tr>
<td>Take/Review</td>
<td>Skeletal</td>
<td>9.90</td>
<td>1.05</td>
<td>6.25</td>
<td>1.12</td>
<td>10.64</td>
<td>1.33</td>
</tr>
<tr>
<td>Listen/Review</td>
<td>Conventional</td>
<td>9.10</td>
<td>1.05</td>
<td>9.75</td>
<td>1.12</td>
<td>10.50</td>
<td>1.18</td>
</tr>
</tbody>
</table>
Figure 1. Mean number of correctly recalled ideas among the nine groups on the structural recall test.

Figure 2. Mean number of correctly recognized facts among the nine groups on the factual recognition test.
Notetaking Performance

To determine the effects of notetaking format (matrix, skeletal, conventional) and gender (male, female) on notetaking performance, separate 3 x 2 ANOVAs were conducted on the number of idea units in notes, the number of words in notes, and the efficiency scores. With respect to idea units, the ANOVA revealed a main effect for gender, $F(1, 51) = 13.76, p < .002, \text{MSe} = 75.68$, where females recorded more idea units than did males ($M = 34.98, 25.73$, respectively). Females recorded an average of 32% of the total lecture ideas, whereas males recorded an average of 23%. There was no main effect for format, and the format by gender interaction was nonsignificant.

The ANOVA for the number of words indicated a significant main effect for gender, $F(1, 51) = 10.26, p < .003, \text{MSe} = 1905.07$, where females recorded more words than males ($M = 153.73, 113.65$). Again, there was no main effect for format and no significant interaction.

The analysis for efficiency revealed no main effects nor interactions.
CHAPTER V
DISCUSSION

The purpose of this experiment was to investigate notetaking behaviors among junior high students asked to record notes within a matrix, on a skeletal outline, or in a conventional manner. The purpose was also to determine the effects of those three notetaking formats relative to the following notetaking strategies: taking notes and reviewing those notes, taking notes and reviewing expert notes, and listening and reviewing expert notes. In a post-hoc fashion, gender was also investigated.

With respect to notetaking format, the present study indicated that subjects who reviewed a matrix format outperformed those who reviewed a skeletal format on the application test, which is a higher-order test requiring the identification of novel examples rather than simple recall or recognition of ideas. More specifically, questions on the application test required subjects to classify novel examples of psychological treatments in relation to one of the psychological approaches. In order to classify (or conceptualize), subjects needed to store characteristics of the approaches, definitions of the treatments, and some original examples for each approach in their long-term memories so as to make comparisons across the psychological approaches.
Furthermore, they needed to match the characteristics and definitions with image approach to their examples. My contention is that the matrix structure facilitated these processes. On the completed matrix, psychological characteristics, treatment definitions, and examples were presented in three consecutive rows so that visual-spatial comparisons could easily have been made both horizontally and vertically. In other words, comparisons of the characteristics, definitions, and examples could have readily been made across the four psychological approaches and, in addition, those characteristics and definitions could have readily been matched within each approach.

Recent studies conducted by N. DuBois (personal communication, May, 1989) also lend support to the matrix structure as a facilitative device for conceptual learning.

Theoretically, subjects reviewing the matrix format should have also performed higher on the synthesis test than subjects reviewing the skeletal format, because the synthesis questions required that comparisons among the four psychological approaches be made. The reason for nonsignificant findings might be attributed to limitations of the test itself. Closer examination of the performance results revealed little variability among synthesis scores. Therefore, the synthesis test did not prove to be a good
discriminator among groups. Other limitations of this test were that subjects had a greater chance of guessing the correct answers than on the other tests and that the test was less reliable or internally consistent than the other tests.

Although the interaction effects for format and strategy were nonsignificant across the four tests, they approached significance for the recall and factual recognition tests (see Figures 1 and 2). It is apparent that subjects provided with skeletal or conventional notes to review after they had listened to the lecture performed as well or better than skeletal or conventional notetakers. Among matrix notetakers, however, those reviewing their own or expert notes obtained higher mean scores than listeners reviewing matrix notes. When subjects were given the matrix to review after they had listened to the lecture, they seemed to be disadvantaged relative to those given the matrix format for notetaking and review. Matrix notetakers had an opportunity to become familiar with the format during the lecture so they would know where ideas were located. However, the format may have been too novel to review effectively when subjects did not have an opportunity to familiarize themselves with it by recording notes within it. Both the product and process functions of notetaking were
supported by the matrix findings, suggesting that it was not only important to have a complete set of notes to review but also that it was additionally beneficial if those notes were personally recorded.

With respect to the mean recall scores only, it can be observed that the two highest mean scores were from matrix notetakers. This finding was expected because deeper processing, via reorganizing information into the appropriate matrix cells, should assist later recall (Craik & Lockhart, 1972).

Males and females differed in terms of mean performance on most of the tests. Females consistently outperformed males on the structured recall test and the factual recognition test, which are both lower-order performance measures. Performance on the application test marginally favored the females, and there was no difference between genders on the synthesis test. These latter two tests are higher-order tests. With respect to notetaking behavior, females recorded significantly more words and ideas in their notes than did males, but used approximately the same number of words to express an idea.

Previous research examining gender in performance has generally indicated that females record more notes than males, but is equivocal with respect to performance differences (Hartley & Davies, 1978).
Perhaps females in this study performed better than males on the factual tests because of their more complete notes (Kiewra, 1985c). They did not out perform the males on the higher-order tests, however, because responding to such questions involves more than having many ideas in notes or memory. In fact, in the present study, there was a trend in that correlation between the number of ideas in notes and test performance was highest with the structured recall test, followed by the factual recognition test, followed by application and synthesis tests. This trend parallels the performance of females over males. This correlation indicates a relationship, and it is not possible to state causes. However, it is surmisable that females performed better than males on lower-order tests due to having more ideas in their notes to review.

Because of the gender effect on notetaking and subsequent test performance, equal numbers of males and females should have been assigned to each experimental condition. Actual numbers of males and females that were in each group appear in Table 4.

With respect to the gender distribution among experimental conditions, it is apparent that more boys than girls were assigned to all three conventional format
Table 4

Number of Male and Female Participants in Each of the Nine Groups

<table>
<thead>
<tr>
<th>Experimental Condition</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
</tr>
<tr>
<td>Take/Rev Own (Matrix)</td>
<td>4</td>
</tr>
<tr>
<td>Take/Rev Exp (Matrix)</td>
<td>5</td>
</tr>
<tr>
<td>Listen/Rev Exp (Matrix)</td>
<td>5</td>
</tr>
<tr>
<td>Take/Rev Own (Skeletal)</td>
<td>4</td>
</tr>
<tr>
<td>Take/Rev Exp (Skeletal)</td>
<td>4</td>
</tr>
<tr>
<td>Listen/Rev Exp (Skeletal)</td>
<td>4</td>
</tr>
<tr>
<td>Take/Rev Own (Conventional)</td>
<td>7</td>
</tr>
<tr>
<td>Take/Rev Exp (Conventional)</td>
<td>7</td>
</tr>
<tr>
<td>Listen/Rev Exp (Conventional)</td>
<td>6</td>
</tr>
</tbody>
</table>
conditions. Figures 1 and 2 illustrate a pattern in which conventional format subjects who took notes and reviewed their own notes obtained the lowest mean recall and mean factual recognition scores. It is plausible that performance in these male dominant groups was lower due to males generally taking less complete notes than females and, therefore, having poorer notes to review in preparation for the factual-ordered tests. Conventional format notetakers who reviewed expert notes, however, performed better on the factual-ordered tests than those who reviewed their own notes. This finding lends additional support to the external-storage idea, stressing the importance of having a complete set of notes to review. One implication of this is that males, because of their relatively incomplete notes, can especially benefit from reviewing expert notes.

There are certain characteristics of the present study that might limit its generalizability. For example, the lecture was presented on a videotape rather than by a live lecturer. The advantage of using videotape was that it allowed consistent presentation of the material for all experimental sessions. However, eighth-grade students are probably more accustomed to live presentations where the lecturer may move around the room establishing rapport with the group and with individuals. The students did not have an opportunity to ask questions during the lecture, so they
might have felt discouraged if they missed or did not understand portions of the lecture. It should be noted, however, that the subjects generally did appear to be interested in the videotaped lecture and on-task, because both experimenters monitored their behavior obtrusively.

Another limitation was the amount of time for review. Subjects reviewing the expert notes were predicted to outperform subjects reviewing their own notes. The brevity of the review period might have restricted students' performance (Kiewra, 1985e). However, the experimenters observed the subjects closely during the review before the period ended. Even if they were given more time to review, they probably would not have known how to use the time effectively. Most subjects appeared to be just reading through their notes.

A third limitation of the study was that subjects were able to observe subjects in other groups recording notes. Matrix and skeletal notetakers were expected to take more complete notes than conventional notetakers because they had cues for notetaking. However, conventional notetakers could have been cued by watching the other notetakers write.

In conclusion, the present study confirmed that junior high-aged students record rather incomplete notes (less than 35½ of total ideas). Therefore, both females and males should be encouraged to record more ideas when attending lectures. The matrix format shows promise for learning both
factual-ordered and higher-ordered information. If a matrix format is used to help prepare students for tests, students should be encouraged to familiarize themselves with the format by recording information within the appropriate cells. It is likely that junior high-aged students do not know how to review their notes in ways that will optimize performance on complex thinking tests such as application and synthesis tests. In fact, in a recent study by Kiewra (personal communication, July 1989), subjects given an expert matrix to review converted it to an outline, suggesting that they really did not know how to review effectively. An area for further study could be to assess the effects of training junior high students how to review their notes to prepare for those higher-ordered tests. Finally, because females recorded more ideas than males on all formats of notes, future investigators of notetaking and performance effects are encouraged to also examine gender in an a priori fashion.
REFERENCE LIST


Appendix A. Idea Units
IDEA UNITS

Psychoanalysis

Where/When Developed:
- developed in Germany
  - during the late 1800's

Major Founder:
- physician named Sigmund Freud

How/Why Theory Developed:
- from Freud's work as a physician
- patients' reports of dreams and thoughts related to emotional problems
- human minds consist of two parts
  - the conscious, part we are aware of
  - the unconscious, part we are not directly aware of
- Freud developed theory to cure unconscious problems

Early Influences:
- philosophers accepted the idea that we have unconscious thoughts
- hypnosis was being used to treat emotional problems
- prior use of hypnosis influenced Freud's treatments
- scientists convinced emotional stress is greater cause of emotional problems than brain damage

Major Focus of Theory:
- unconscious conflicts from early childhood have lasting influence on personality
  - bringing these conflicts into awareness helps people feel better
  - also helps them behave more normally

Other Characteristics:
- conscious part of our minds is a small portion
- unconscious part of our minds is larger/more significant
- unconscious part contains our instincts/drives
- drives include hunger, thirst, pleasure, curiosity
- instincts/drives determine our behavior
- humans are ruled by unconscious forces
- superego (conscience) is formed by parent values
  - superego is mostly unconscious
- superego helps control instincts/drives
- superego helps us act in a moral way
Appendix B. Skeletal Outline Format
### Psychoanalysis

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<tr>
<th>WHERE/WHEN DEVELOPED:</th>
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<table>
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<tr>
<th>MAJOR FOUNDER(S):</th>
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<table>
<thead>
<tr>
<th>HOW/WHY THEORY DEVELOPED:</th>
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<table>
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<th>EARLY INFLUENCES:</th>
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<table>
<thead>
<tr>
<th>MAJOR FOCUS OF THEORY:</th>
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<table>
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<tr>
<th>OTHER CHARACTERISTICS:</th>
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<tr>
<th>EXPLANATIONS OF TREATMENT:</th>
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</thead>
</table>
Appendix C. Matrix Format
Fill in each cell of the matrix below with the appropriate information given in the lecture.

<table>
<thead>
<tr>
<th>Psychoanalysis</th>
<th>Behavioral Theory</th>
<th>Gestalt Theory</th>
<th>Humanistic Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where/When Developed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Founder(s)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>How/Why Theory Developed</td>
<td></td>
<td></td>
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<tr>
<td>Early Influences</td>
<td></td>
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<td></td>
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<tr>
<td>Major Focus of Theory</td>
<td></td>
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<tr>
<td>Other Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explanations of Treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix D. Conventional Expert Notes
Psychoanalysis

*Developed during the late 1800's in Germany
*Major founder of Psychoanalysis was Sigmund Freud, a physician
*The theory developed from Freud's work as a physician when he observed that his patients dreams and thoughts were related to their emotional problems.
- Freud believed that our minds consist of two parts: the conscious part we are aware of and the unconscious part we are not aware of.
- The theory developed to cure people's unconscious problems.

*An early influence on the theory of Psychoanalysis was that philosophers were beginning to accept the idea that we have unconscious thoughts.
- Also, hypnosis was being used to treat emotional problems and this influenced Freud's choice of treatments.
- Another influence was that scientists were convinced emotional stress causes emotional problems to a greater degree than brain damage.

*The major focus of the theory is that unconscious conflicts from early childhood have lasting influences on our personality. Bringing these conflicts into awareness helps people feel better and behave more normally.

*Other characteristics of the theory include:
- The conscious part of our minds is a small part.
- The unconscious part of our minds is larger and more significant.
- The unconscious part contains our instincts and drives.
- The instincts/drives determine our behavior.
- Humans are ruled by unconscious forces.
- A part of our minds called the superego helps to control our impulses so that we act in a moral way.
- This superego (conscience) is mostly unconscious.

*Treatment under this theory includes analyzing dreams to help uncover clues to the unconscious. Another method called free association is a way of letting unconscious thoughts enter consciousness by relaxing and letting every thought be shared with the therapist.
Appendix E. Expert Skeletal Notes
EXPERT SKELETAL NOTES

Fill in the space under each heading with the appropriate information given in the lecture.

**Psychoanalysis**

**WHERE/WHEN DEVELOPED:**
- Germany
- late 1800's

**MAJOR FOUNDERS:**
- Sigmund Freud

**HOW/MAY THEORY DEVELOPED:**
- from Freud's early work as a physician
- he observed that patients' dreams & thoughts were related to their emotional problems
- Freud believed human mind consists of two parts: conscious (awareness) and unconscious (unawareness)
- developed to cure unconscious emotional problems

**EARLY INFLUENCES:**
- philosophers accepting that humans have thoughts below a conscious level
- hypnosis used to treat emotional problems
- prior use of hypnosis influenced Freud's treatment
- scientists were convinced emotional stress is greater cause of abnormal behavior than brain damage

**MAJOR FOCUS OF THEORY:**
- unconscious conflicts from early childhood have lasting influences on personality
- bringing these conflicts into awareness helps people to feel better and act normally

**OTHER CHARACTERISTICS:**
- conscious part of mind is smaller part
- unconscious part is larger, more powerful and contains instincts and drives (hunger, thirst, pleasure, curiosity)
- drives determine our behavior so we are ruled by unconscious forces
- superego (conscience) comes from parent values and helps us control drives so we act in a moral way

**EXPLANATIONS OF TREATMENT:**
- dream analysis - helps uncover clues to unconscious
- free association - involves relaxing and talking freely so every thought is shared with therapist
- free association is another way of letting unconscious thoughts enter awareness
Appendix F. Expert Matrix Notes
<table>
<thead>
<tr>
<th>EXPERT MATRIX NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scaled Down Size)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Path/When Developed</th>
<th>Psychoanalysis</th>
<th>Behavioral Theory</th>
<th>Gestalt Theory</th>
<th>Humanistic Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where/When Developed</td>
<td>Late 1800's Germany</td>
<td>Early 1900's United States</td>
<td>Early 1900's Germany</td>
<td>1940's United States</td>
</tr>
<tr>
<td>Major Founder(s)</td>
<td>Sigmund Freud</td>
<td>J. B. Watson</td>
<td>Max Wertheimer</td>
<td>Abraham Maslow, Carl Rogers</td>
</tr>
<tr>
<td>How/Why Theory Developed</td>
<td>From Freud's early work as a physician, he observed that patients' dreams and thoughts were related to their emotional problems. Freud believed human behavior was a product of both conscious (awareness) and unconscious (unconscious) forces developed in early unconscious emotional problems.</td>
<td>Behaviorists believe that learning, conditioning, and social forces play a significant role in shaping human behavior.</td>
<td>Werner's early work focused on the importance of the individual's experiences and how they contribute to the development of the self.</td>
<td>Abraham Maslow believed that human potential for growth and self-actualization is innate.</td>
</tr>
<tr>
<td>Early Influences</td>
<td>Philosophy accepting that humans have thoughts below conscious level. Hypnosis used to treat emotional problems. Early use of hypnosis influenced Freud's treatment. Scientists were concerned with emotional stress in greater cause of abnormal behavior than brain damage.</td>
<td>Applied psychology involved behavior in reaction to their environment. They respond to get rewards or to avoid punishment (learned responses).</td>
<td>People's behavioral conditioning or learning through the association of events — dog was taught to salivate to a bell after pairing the bell with food every time.</td>
<td>Moral and ethical development is part of the process of becoming a complete human being.</td>
</tr>
<tr>
<td>Major Focus of Theory</td>
<td>Conscious conflicts from early childhood have lasting influences on personality. Bringing these conflicts into awareness helps people feel better and act normally.</td>
<td>Behavior modification determines his behavior environment includes all events outside one's body that make change in environment before behavior can change.</td>
<td>A person's present is more important than the past.</td>
<td>People should be treated with respect and each person is capable of developing toward potential if given opportunity.</td>
</tr>
<tr>
<td>Other Characteristics</td>
<td>Conscious part of mind is smaller part. Conscious part in larger, more powerful conscious instinct and drives (anger, sexuality, curiosity). Unconscious forces operate on cultural level without awareness of control.</td>
<td>Human does not choose the way they behave. Behaviors are learned.</td>
<td>The human is more important than the past. To understand oneself, must develop insight into feelings.</td>
<td>The best large-scale movement in psychology. Human can choose their behaviors.</td>
</tr>
<tr>
<td>Explanations of Treatment</td>
<td>Freud analysis helps uncover clues to unconscious. Free association involves relaxing and telling freely so every thought is shared with therapist. Free association in another way of getting unconscious thoughts enter awareness.</td>
<td>Rewards used to increase positive behavior (blue ribbon for doing well). Punishment used to decrease negative behavior (taking too long to eat).</td>
<td>Group therapy — others can help provide insight into present feelings by interpreting body language (non-verbal clues or real feelings).</td>
<td>Client-centered therapy used and developed by Rogers. Rogers is for client or patient to learn to help himself. Therapist is accepting and supportive and shows client that they can make positive changes in their lives.</td>
</tr>
</tbody>
</table>
Appendix G. Structured Recall Test
Structured Recall Test

Respond to the following questions about the four theories of Psychology: Behavioral, Gestalt, Humanistic and Psychoanalytic. Make sure to clarify which theory is tied to each response.

1. State the major focus of each theory of Psychology:

2. List one major founder for each theory:

3. Explain one type of treatment for each theory:

4. State where and when the Psychoanalytic theory developed:

5. State where and when the Humanistic theory developed:
6. Explain how and why the Behavioral theory developed:

7. Explain how and why the Humanistic theory developed:

8. List as many characteristics as you can for Gestalt theory:

9. List as many characteristics as you can for Psychoanalytic theory:
Appendix H. Synthesis Test
Synthesis Test

For each of the following questions there are two correct answers. List the correct answers (A, B, C, D) for each question in the spaces provided.

A. Psychoanalytic
B. Behavioral
C. Humanistic
D. Gestalt

___ ___ 1, 2. Which two branches of Psychology began in Germany?

___ ___ 3, 4. Which two branches of Psychology support the idea that behavior is determined by events out of our immediate control?

___ ___ 5, 6. Which two branches of Psychology agree that understanding the human personality comes from viewing the whole person?

___ ___ 7, 8. Which two branches of Psychology support the idea that humans have an inborn guiding force that helps them develop in a positive way?

___ ___ 9,10. Which two branches of Psychology support the idea that humans have the ability to choose their own destiny?

___ ___11,12. Which two branches of Psychology were developed during the early 1900's?
Appendix I. Application Test
Application Test

Each of the following test items is a practical illustration of a particular branch of Psychology. For each of the following items, indicate the branch of Psychology (A, B, C, D) that is being illustrated.

A. Psychoanalytic
B. Behavioral
C. Humanistic
D. Gestalt

___ 1. Mr. Kent described for his therapist the details of an unusual nightmare he had last night.

___ 2. When his patient told him about how she stole some money, Dr. White was very careful not to make verbal judgments about her.

___ 3. While Barb was telling about her lunch date, the others tried to interpret her real feelings.

___ 4. When Bob found the wallet, he was tempted to keep the money inside but something in his mind told him to give it back to the owner.

___ 5. Sadie helped her daughter lose weight by giving her a dollar for each day she did not eat any desserts.

___ 6. After a year of therapy, Kathy decided to help homeless people find jobs and homes.

___ 7. Mr. Tee said he could not remember being teased when he was in nursery school, but all of his friends remembered it well.

___ 8. Sam taught his cat to roll over by giving him tuna after each time he physically rolled the cat over.

___ 9. Jeffrey learned that every time he threw spitballs, he would have to clean all the desks.

___ 10. Bill's therapist made him aware that every time he started talking about his brother, his nostrils flared.

___ 11. Sally and her boyfriend acted out their angry feelings for the rest of the people.
12. Mrs. Hall recalled the details of her grandma's death, which occurred when she was 6 years old.

13. The students examined the painting in its entirety, taking in the combination of its many features, admiringly.

14. The therapist decorated her office in calm, relaxing color tones and arranged her furniture to create a comfortable, non-threatening atmosphere.

15. Martin Luther King and Albert Einstein were individuals who many people strive to become like.

16. Martha got her husband, George, to stop snoring by attaching a loud buzzer to him which sounded every time he began to snore.

17. Mrs. Rich felt relieved after finally expressing the anger she had been holding inside since her father left when she was four.

18. Tim loved his wife in a way that gave her the self-confidence to reach all of her goals.

19. Jenny cleaned her room daily after her dad said he would put a sticker on her calendar for each day she kept her room neat.

20. The therapist asked John to pretend he was having breakfast with his wife and to demonstrate the discussion that he and his wife had that morning.
Appendix J. Factual Recognition Test
Factual Recognition Test

For each of the following items, indicate the branch of Psychology (A, B, C, D) that is most closely associated with the provided statement.

A. Psychoanalytic
B. Behavioral
C. Humanistic
D. Gestalt

___ 1. Developed by Sigmund Freud.
___ 2. All of the senses need to be used to fully understand a person.
___ 3. Developed because other branches ignored positive traits of humans.
___ 4. It is believed that we are ruled by unconscious forces.
___ 5. Unspoken language is a clue to real feelings.
___ 6. Treatment may involve the use of rewards and punishment.
___ 7. Developed primarily by Wertheimer.
___ 8. Stresses uniqueness and dignity of each individual.
___ 9. Therapy includes free association.
___10. A dog was taught to salivate to the sound of a bell.
___11. Hypnosis was used to treat patients with emotional problems.
___12. Insight into present functioning is necessary.
___13. Emphasis is on becoming the best you can be.
___14. It is believed that disturbances in personality are learned.
15. Early childhood experiences have a lasting influence on our personality.

16. Animal Psychology was an early influence.

17. A method of treatment is client-centered therapy.

18. An early influence was new discoveries in Physics.

19. Therapy involves an environment of total acceptance.

20. Events surrounding a person cause them to make particular responses.