THE RELATIONSHIP OF LEARNING STRATEGIES TO READING COMPREHENSION AMONG COLLEGE FRESHMEN USING NARRATIVE AND EXPOSITORY TEXTS

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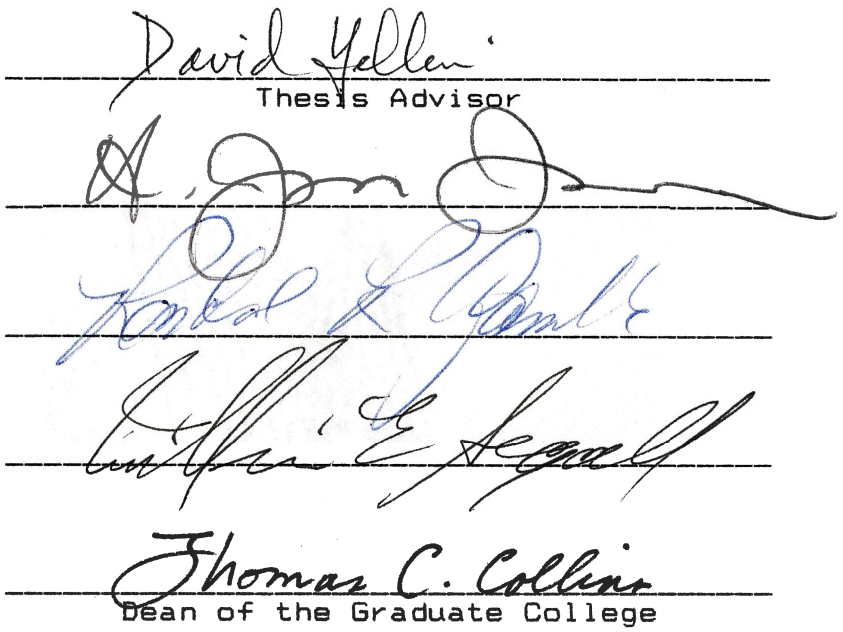

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TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

College students have to learn from text materials. While learning is very much dependent on the ability to read and remember texts, many students entering college have not learned the skills and strategies that enhance learning through reading texts (Anderson, 1979: Brown, 1979: Garner & Alexander, 1981, & 1982). Both proficiency in reading and learning cover a broad scope. However, early educational psychologists, (e.g. Dewey 1910; Huey 1968; Thorndike 1917) had recognized self-awareness and self-control as important factors in learning. Recent researchers, (Baker & Brown, 1984) believe that every college student must be aware of certain skills, strategies, and resources that are needed to perform the learning task effectively. Unfortunately, many studies found that college students often did not use effective strategies for monitoring and contructing meaning when they read texts (Baker & Brown, 1984; Brown & Smiley, 1977; Brown, Armbruster, & Baker, 1984). Studies such as these revealed that students do not use effective strategies for monitoring meaning, locating important ideas and remembering key ideas of the text. Baker and Brown

(1984), asserted that students' ineffective use of strategies are due to students' lack of awareness about learning strategies and lack of knowledge of text features.

In recent years, both the structure of the material to be learned (semantic and conceptual) and learner characteristics (aptitude, prior knowledge and experience) have been shown to significantly influence the learning of different types of texts (Mitchell & Irwin, 1985). In supporting this, Simpson (1986) provided reasons why students are not successful in academic courses in college. She reported that some college students lack the ability to learn independently from texts. Independent learning requires prior knowledge in the achievement of higher-level thinking and in comprehension skills. When asked how they learn, these students were not able to describe it, nor were they able to show their awareness of the learning process (Mitchell & Irwin, 1985; Simpson, 1984; Baker & Brown, 1984). This awareness of the learning process is known as "metacognition".

Recent trends in college programs indicate that many students who fail to succeed have limited learning skills and strategies. Flavell (1979) stated that the learning process requires the interaction of three metacognitive variables: person, task, and strategy. Learning requires students to be aware of their own strengths and weaknesses, their ability to understand what the tasks are, their ability to plan and use strategies to meet these academic demands. Flavell found

that these variables interact and influence all learning situations.

Brown (1980) pointed out the role of metacognition in effective learning. She stated that metacognition includes "predicting, checking, monitoring, reality testing and coordination, and control of deliberate attempts to study, learn or solve-problems" (p. 454). Metacognition refers to the knowledge of the cognitive process that students use while undertaking cognitive tasks (Flavell, 1976; Brown 1978; Weinert & Kluwe, 1987).

Similarly, Brown (1982) further stated that college success is not just a matter of innate ability and long hours of studying, but also knowing how to learn. She identified the activities of monitoring and controlling the strategies as "metacognitive activities" for processing text. She presented the following metacognitive activities: a) identifying important aspects of a message in the text, b) focusing on the major content, monitoring on-going activities, c) self-questioning to determine if goals are met, and taking corrective measures for failures in comprehension (Brown, 1982).

Good students usually demonstrate good learning skills. Metacognitive skills are illustrated through students' clear understanding of the demands in given tasks, and the ability to identify important parts of their texts when studying (Brown, 1982). Students who are effective learners, monitor their reading comprehension at the same time using strategies

when they encounter comprehension failures. Constantly, these students review and self-question themselves to check if their goals have been met. Recall of the information learned becomes easy when the students are able to comprehend their texts. These conscious coordinations indicates metacognition.

For many years, efforts in teaching reading and study skills were mainly directed towards the remedial college students. Since the 1970's, efforts in the identification and management of skills and strategies were started with the regular student population. However, many college programs are still not catering to metacognitive learning.

Simpson (1984) and Armbruster (1986) stated that college reading and study-skills programs provide the specific skills and strategy training without emphasizing the inter-relationship of the various areas of the learning process. The authors asserted that to improve learning among college students, it is essential that educators themselves understand more about the different factors that influence learning. Educators have also to concentrate on the conditions and the deliberate use of learning strategies aimed at improving students' academic performance. Therefore, educators will have to find effective ways to help the individual student to relate strategies to his/her learning tasks and the relationship of one strategy to the other.

Ryan (1980) and Simpson (1986) added that students were

using inadequate skills, because they were not taught effective strategies. Learning strategies and the degree of effectiveness vary from one individual to another because of their learning behaviors. Educators must consistently be aware that students on entering colleges may not be equipped with the necessary skills and strategies required for learning. There is a need to raise the awareness of, and interest in, the learning strategies of college students of college students for more effective learning and to prevent frustrations, failures and dropouts (Simpson, 1984).

Another branch of research has also addressed the importance of helping students to improve their learning through comprehension skills (Durkin, 1978-1979, 1981), and on the relationship between the learner's knowledge and the text structure (Brown, Campione, & Day, 1981). Since college learning requires the recalling and retaining of information, emphasis is also placed on improving students' comprehension of texts materials. Schema theory explains the mental process that are involved in successful interaction with text (Durkin, 1978-79). It focuses on how readers' prior knowledge influences their understanding of texts. Durkin (1984) stressed the importance of schema as a network of concepts that form the prior-knowledge base applied by the readers to new textual information.

The research on schema indicates the importance of college readers activating proper schema to deal with understanding difficult texts. Samuels and Kamil (1984) in

the Handbook of Reading Research, stressed the importance of schemata in reading as they involve a high level of abstraction, categorization and inference. At the college level, where independent learning forms almost all learning situations, students need all the assistance they can get from texts.

Theoretical Background

The term "metacognition" was made popular in the Mid-1970's with the publication of the Monographs of the Society for Research in Child Development by Kreutzer, Leonard, and Flavell (1975). This term literally means "transcending knowledge" which refers to one's understanding of any cognitive process (Brown, Armbruster & Baker, 1980). More specifically it refers to knowledge about self, task, and strategy variables relevant to thinking, and the individual's recognition of the need to use this information to learn (Flavell, 1978). Flavell (1976) states that:

> Metacognition refers to one's knowledge concerning one's own cognitive processes and products or anything related to them, example the learning relevant properties of information or data. Metacognition refers, among other things, to the active monitoring and consequent and orchestration of these processes in relation to the cognitive objects or data on which they bear, usually in the service of some concrete goal or objective (p. 232).

Brown (1978) started another branch of metacognition which focused on the executive control processes of planning, monitoring, checking and revising. Paris and Winograd (1988) further expanded along this line summarized metacognition to

contain both cognitive self-appraisal and self-management. Baker and Brown, (1984) defined self-appraisal as "the knowledge learners have about their own cognitive resources and the compatibility between themselves as readers and the demands of a variety of reading situations" (p. 501). The second metacognitive knowledge, self-management, is "the self-regulatory mechanisms used by an active learner during an ongoing attempt to solve problems" (p. 502).

Schema theory on the other hand, is about the students' prior knowledge and how it facilitates the understanding of texts. Devine (1986) defines prior knowledge as "all the information and ideas, all the perceptions and concepts, the images and ideational propositions, as well as the intellectual residues of emotional experiences, held in long-term memory by readers" (p. 25). This knowledge is packaged into units called schemata. Students build schemata throughout their lives. These schemata in turn influence the processes of perception, remembering, and understanding texts. Clearly, the lack of prior knowledge and lack of activating it affect a student's processing of text information (Anderson, 1977; Collins & Smith, 1980).

The capacity for learning also involves having strategies to acquire information from texts, awareness of the ongoing activities to perform certain tasks, and able to remember and recall information required at a later date. Duffy (1982) described strategies as the "secret algorithms of learning". Nisbet and Shucksmith (1986) referred to

strategies as "integrated sequence of procedures selected with a purpose in view, and that successful learners have developed a range of strategies from which they are able to select appropriately and adapt flexibly to meet the needs of a specific situation" (p. 6). They defined strategies as "the executive processes to choose, coordinate, and apply the study skills". Moreover, strategies have purposes, contain a sequence of activities, and are able to be modified to fit the context. With constant usage of learning strategies and understanding of the goals over time, learners will gradually refined their own repertoire of learning strategies, and the proficiency in controlling and regulating them.

Brown (1982), and Roehler, & Duffy (1984) advocated learning strategy training for less able students because it helps students to become aware of the strategic nature of learning. These researchers felt that students must know their own strengths and weaknesses in comprehending text materials. Their inability to do so would result in difficulty in understanding, inferring, and recalling meaning from text materials (Brown, 1978). Learning strategies and learning skills are aids to learning. Students must know how to use them effectively to comprehend and acquire information from what they read. Skills are simply abilities which have been developed through practice, and are existing cognitive routines for performing specific tasks. Learning strategies on the other hand are the means of selecting, combining, or redesigning those cognitive routines. Some examples of

effective and appropriate learning strategies used by college students are planning ahead, monitoring, checking, summarizing, imaging, estimating, revising, and self-testing (self-questioning) (Brown, 1982). Alexander (1986), identified a modification of the categories of learning strategies which college students used for processing texts. This classification of strategies was originally developed by Farr and Mitchell (1981), The three study-strategy categories were constructed to reflect which students's strategies were text-driven, schema-driven, or mixed. These strategies were identified and described as follows:

> Text-driven-strategies. including circling, underlining or rereading, that demonstrate no deviation from or modification of the existing text; Mixed-strategies, such as paraphrasing, summarizing, and sequencing, that involve some elaboration of the text; Schema-driven-strategies, such as prediction question formulation, generating analogies, and imaging that are the least dependent on the text. (Alexander, 1986, p. 96)

Since learning and reading have remained a process of complex combination of factors "involving the whole physical, intellectual, perceptual, and spiritual life and growth of the individual" (Carroll, 1985). It is universally agreed that students learn and remember only when comprehension occurs and when the texts have meaning (Baker & Brown, 1984). Knowledge and control of learning strategies can be taught to college students so that they can use the learning strategies to learn from the various sources and text (Alexander, 1986; Anderson, 1980; Baker & Brown, 1984). Baker and Brown (1984) argue that reading depends on the reader's access to learning

strategies as well as the above stated factors. Furthermore, the researchers believe that learning strategies taught would equip the college students with sufficient knowledge of the affect the reading performance (Brown & Smiley, 1979; Clay, 1972; Nist, Simpson, & Hogrebe, 1985; Olshavsky, 1976-77). From the view based on metacognitive theory (Flavell, 1987: Baker and Brown, 1984), more dimension needs to be added to the research in learning strategies.

Since the success of teaching college students in learning strategies has captured the attention of researchers and educators (Dansearu, 1978), teaching university students to employ, regulate, and transfer learning strategies to content area learnings should be the focus of any reading program (Simpson, 1986). Metacognitive theory impacted the learning approaches and has highlighted the importance for strategy maintenance and transfer of learning from one situation to another. Brown and Palincsar (1982) pointed out that college students must be able to recognize the complex interaction of many forms of knowledge and activities that are involved in the learning process.

Educators are concerned with the failure in the college reading programs (Baker & Brown, 1984). Even though major colleges and universities have dramatically expanded their services to teach learning strategies, some programs are not designed to cater to the needs of freshmen because skills and strategies had been taught in isolation.

At the college level, learning independently from the

text material involves the recall and organization of information for efficient presentation either on assignments or in tests. This often focuses on explicit understanding of what had been learned. According to Simpson (1986) independent learning requires learners' awareness of their own comprehension abilities and their controlled efforts to understand what they read, and then apply insights into their existing abilities. Therefore, they must also be aware of their past learning experiences, skills, strategies, and resources which will help them in understanding their present encounters with different types of texts (Alexander, 1986).

These studies on metacognition, have contributed positive results and the empirical base for greater understanding of the learning process (Flavell, 1981; Nist, Simpson, & Hogrebe, 1985; Annis, & Annis, 1982). The metacognitive theory focuses on self-monitoring and self-regulation of learning strategies. In short, success in college learning is associated with these factors: a) take an active role in the learning process, b) make efforts to understand and remember essential information, c) take deliberate action to ensure that the material is comprehensible and memorable, d) have enough knowledge of the four major variables such as text, task (criterion), strategies, and learner's characteristics, e) know how the four variables interact with one another to affect learning outcomes (Brown, Bransford, Ferrara, & Campione, 1983; Brown, Campione, & Day, 1981). Since these factors are not

independent of one another, but are highly interactive, educators believe that systematic studies would provide effective methods of bringing together the various components of post-secondary education and show how those components relate to one another.

Wellman (1983) stated that metacognitive knowledge is not a collection of facts about cognition, but rather "an intricately interwoven system of knowledge" (p. 32). For example, the metacognitive knowledge in reading text is the knowledge that students have about factors such as vocabulary, syntax, the clarity of presentation, the structure (organization), and the topic itself. These factors are related to comprehension because when students have to deal with the difficulty and coherence of texts, these are the same factors that may speed or impede learning (Anderson & Armbruster, 1986). These many features of the reading materials influence students' learning and contributes to reading difficulty. Since college texts are main sources for students to obtain information, yet do not provide adequate strategy cues, students must have the learning strategies to enable them to use context in constructing a representation of text, aware of semantic and syntactic constraints of the language, able to use various kinds of text structure, and aware of the characteristics of each type of texts (Dansereau, 1978).

In addition, effective learning requires learning strategies such as clarifying purpose for reading,

identifying important aspects of the text, focusing attention on major content, monitoring as reading occurs, engaging in self-questioning activities, and taking corrective measures when text has not been comprehended (Baker & Brown, 1984). Learning from text is an individual process and ability, so the organization and structure of the text become important factors influencing the individual's success. Taylor (1982) reported that the most important factor in the comprehension of text is the reader's ability to detect its organizational "structures". Text structure is a pattern that presents the information, and the ideas of the author. When the text structure is done skillfully, it enhances the readability of the text. Other text factors that cause problems to the readers are syntactic complexity, lexical density and rhetorical anomaly. These text factors can be overcome if the readers are strategically trained.

Just and Carpenter (1980) suggested that learners are constantly attempting to integrate new information with the ongoing text and that such integration is facilitated at points where a linking relation can be made. The reader and text interaction is guided through techniques such as self-questioning inducing imagery by visualizing text scenarios oral reading, study guides and text outlines.

Basically texts used in the educational situations are narrative and expository type texts. Kieras (1985) noted that in schools expository texts form the major bulk of the learning materials. Expository text expounds, explains,

and sets forth information and ideas. These texts often present densely packed, complex information which serve as "vehicles for knowledge acquisition" (Kintsch, 1982, p. 87). It is often distinguished from narrative text by its organization. It is organized to state its point and its thesis effectively. Expository text contains major rhetorical patterns which include analyses, cause-effect, chronological sequencing, compare-contrast, definition, enumeration or listing, illustration, generalization with supporting evidence, description, and problem-solving (Horowitz, 1985; Muth, 1987). Meyer and Freedle (1984) described causation and comparison, as more organized structures, and that they facilitate a better understanding of the content. They added that content presented in a collection or a description is a more difficult structure for recall. Obviously, there are overlaps between some of these patterns, and extended texts seldom use one pattern exclusively.

Researchers have shown that organizational structures are essential in well-formed texts (Mandler & Johnson, 1977; Meyer, 1975) and these structures do pose problems for readers (Meyer, Brandt, & Bluth, 1980). These organizational structures provide a framework to convey the concepts of the text to the readers.

Narrative text materials on the other hand are organized around plot, theme, characters, setting, the writing style of the author, and its genre. Narrative text structure can be

described as story grammar categories. The plot of the narrative text is usually connected by some chronological linkage built around the characters of the story. Vladimir Propp, suggested that (1) functions of characters serve as stable, constant elements in a story, and its fundamental component; (2) the number of functions is limited; (3) the sequence of functions is always identical; and (4) all tales are of one type in regard to their structure (see Morgan & Sellner, 1980, pp. 181-184).

The purpose of narrative text is (1) to tell a story, often accounts of personal experiences to make a point; or (2) interwoven into articles and themes to clarify and add interest. Often the plot is made more complex through the use of flashbacks, different narrators, and different plots woven into one story. Setting introduces the leading characters and provide background information. Olson and Gillis (1987) suggested that the organizational structure presented in both narrative and expository passages to be crucial to fair and accurate appraisal of students' reading abilities.

When students read, their tasks also determine the criteria necessary for the different strategies to be used. Usually the task will set the reading behavior of the learners, so that they are able to adjust their reading rate to meet specific purposes. Research on university students showed that some students lack the ability to set their own goals for learning (Alexander, 1986; Simpson, 1983; &

Schumeck, 1983). Often these students are unable to balance what was learned with what is to be learned. To understand the procedure of how student's process information to obtain knowledge from texts is presently constituting a major challenge for psychologists, reading researchers, and educators.

Brown and Smiley (1979), suggested that age and experience enhanced learning. With guidance and training young learners will develop into mature, effective learners at different levels of the educational ladder. Similarly, Clay (1972) and Olshavsky (1976-77), found that all students used learning strategies, but the better students were more consistent and spontaneous in using their learning strategies. Wong and Jones (1981) found that cognitive and metacognitive strategy training had some success in improving students' reading comprehension. Most of these studies were done with students who are younger (pre-college) using expository texts. Therefore, metacognitive training, which aims to induce explicit behaviors in students may be more useful to college students (Brown, Campione, and Day, 1981).

Reading researchers and educational psychologists (Anderson, 1980; Ausubel, Novak, and Haneisan, 1978; Goetz, 1984; Rothkof, 1981, 1982) had advocated that active strategic reading is essential in improving performance in overall comprehension tasks, which will subsequently produce independent readers and learners. Since learning in colleges

and universities is content-based, students should be provided with the learning strategies necessary for future learning.

To facilitate learning educators have to find effective learning strategies for college students and to show them when, where, and how those learning strategies aid them in attaining academic success. Hence, the primary concentration at college levels should be the provision of realistic tasks, the application of learning strategies so that students themselves can plan, monitor, and evaluate their own learning. Educators need to take steps to generate spontaneous learning strategies, and stimulate cognitive growth in order to enhance successful learning.

Therefore, a systematic attempt to examine college freshmen's usage of learning strategies and its relationship to comprehension scores on different texts is warranted. This study will examine college freshmen's learning strategies and its relationship to reading comprehension, using both narrative and expository texts. It will take into consideration the initial differences of the reading abilities of these students.

It is believed that data from students are needed to determine the current state of their learning strategies in order to provide insights for the instruction of reading and learning skills programs. Such information would be helpful to students, educators, and researchers, especially so in programs that had taught study skills and learning strategies

helpful in programs that had reduced their reading courses to teaching techniques for passing examinations, and for coping with the system rather than developing the skills of learning. These situations support Simpson's (1984) point that there is a tendency in reading programs to provide specific areas of study without emphasizing the interrelationship of those areas. Therefore, there is an urgent need for educators to provide a knowledge of learning strategies and the practice which students could use to improve their learning.

In summary, this investigation will attempt to determine students' awareness of their learning strategies. It is hoped that some evidence will evolve which can be used to determine how college reading and study skills programs can better meet the needs of current incoming freshmen. College programs must try to promote the executive processes of learning which is the control and regulation of strategies to improve academic achievement. It appears that there is a need to help students become more aware of their own learning abilities, acquire more learning strategies and train them in the appropriate usage to facilitate independent learning.

Statement of the Problem

It is the primary contention of this study that data from students are needed to determine learning strategies used by college students, the relationship between college students' learning strategies, and reading comprehension

using different texts. It will investigate whether different categories of strategies relate in the same manner for subjects with different abilities using both narrative and expository texts. This study will: 1) provide additional insights into the learning strategies of college students, and 2) facilitate and provide information for the development of effective instructional reading programs in college.

Purpose of Study

The purpose of this study will be three-fold: 1) to investigate the relationships among categories of learning strategies (text-related, mixed, and schema), and text types (expository and narrative) on comprehension scores of college students; 2) to determine whether or not there are overall differences among the levels of each factor (main effects), and to examine whether or not each possible pair of factors combine in such a way as to have a unique relationship on the learner's comprehension scores; 3) to determine the interaction (if any) between strategy, text, and gender. It will examine the different learning strategies used by students in learning different texts.

Testing of Hypotheses

The following null hypotheses will be tested:

1. There are no statistically significant differences among the three categories of learning strategies (schema-related, text-related, and mixed).

related, text-related, and mixed).

2. There is no statistically significant difference between male and female subjects in reading comprehension.

3. There is no statistically significant difference between the text narrative and expository texts.

4. There is no statistically significant interaction between the learning strategy factor and the gender factor.

5. There is no statistically significant interaction between the learning strategies and types of text.

6. There is no statistically significant interaction between the gender factor and the types of text factor.

7. There are no statistically significant interaction among the learning strategies, gender, and types of text.

Delimitations

a) The subjects will be all male and female students enrolled in the Freshman Composition and College Reading and Study Skills courses at a comprehensive university in the Mid-West.

b) The testing of the subjects will be carried out in the regular classrooms for different sections of the same course.

Limitations

1) The subjects were all volunteers.

2) The testing was administered to all the subjects by the regular class instructors.

Assumptions

1) It was assumed that subjects were motivated to give their best effort on all the tests.
2) Testing procedures were assumed to remain reliable throughout the duration of the testing session.
3) The subjects were assumed to recall self-reported study techniques correctly to their best knowledge.
4) The Nelson-Denny Reading Test (Brown, Nelson, and Denny, 1973) used in this study was assumed to give an adequate measures for college students of the various reading levels for which it was intended.
5) All measures of achievement used in the study provide reasonably valid and reliable data.

Definition of Terms

Some terms particular to this study are defined as follows:

Argumentative discourse: is prose that presents and defends a position.

Categories of learning strategies: are process and methods that a student can use in order to acquire information and later retrieve and use the information.

Cognitive strategy: is the intellectual plan or operation used to study, solve a problem, or cope with a situation.

Comprehension: is the student's understanding of ideas stated by the author of the text. It is measured by

the response on the objective type test and short answers.

Descriptive discourse: is prose that function to evoke sense of importance of impression of people, things and experience.

Effective learning strategies: are "thoughts of behaviors that help students acquire new information so that the new information is integrated with the existing knowledge in a learning situation. Learning strategies also include summarizing, paraphrasing, imaging, creating analogies, note-taking, underlining, and help the retrieval of stored information" (Weinstein, 1987).

Expository text: passages that contain the five rhetorical structures of causation, comparison, response, collection and description that the writer uses to convey the relationships among ideas in a passage to the readers (Mayer, 1981). Expository text is subject matter oriented, time is not focus, and usually connected by logical linkage.

Factor: a nonmetric independent variable also referred to as a treatment or experimental variable.

Interaction effects: the joint (or combination) effects of independent variables on the dependent variable beyond the separate influence of each independent variable.

Main effects: individual effects of each independent variable on the dependent variable.

Metacognition: having the knowledge and having understanding, having control over them, and having appropriate use of that knowledge (Tei and Stewart, 1985).

Metacognitive knowledge: the knowledge students have about factors such as vocabulary, syntax, the clarity of presentation, the structure (organization), and the topic itself (Baker and Brown, 1984).

Narrative discourse: is prose that tells a story, describe events and to record people in action.

Strategy: a deliberate and planned activity or routine introduced into the service of learning or problem solving (Brown, Bransford, Ferrara, and Campione, 1982).

Learning strategies: the executive processes which choose, coordinate, and apply the study skills (Nisbet, and Shucksmith, 1986).

Study skills: techniques which help a learner to read, or learn for specific purposes with the intent to remember.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The impact of metacognitive theory and schema theory have brought forth two important components of the learning process: (1) the individual student's attempt to control and regulate the learning strategies and (2) prior knowledge of texts.

This chapter presents a review of literature which focuses on five areas: The first section contains the two theoretical perspectives: metacognitive theory and schema theory which generated the studies in learning strategies and the comprehension process. The second section focuses on studies that were designed to increase students' text processing strategies. The third section concentrates on learning strategies students used to help them learn from different types of texts. The fourth section stresses types of texts used by college students in acquiring information for learning. The fifth section presents some conclusions regarding the findings and methodologies of metacognitive theory research.

Theoretical Perspectives in Learning Strategy

Although historically colleges and universities have not been leaders in the areas of remedial and basic reading programs, "open door" policies are forcing educators to re-examine their programs. Since reading is the basis of most college courses, it seems logical to suppose that when students find reading easy, positive attitudes towards reading for information develops. Students entering colleges and universities do not have enough basic learning skills and strategies for independent learning to acquire information from reading their texts (Simpson, 1986). Demographic, technological, social and economic changes are forcing universities and individuals to focus on college reading programs (Simpson, 1986; Brown, 1984).

Metacognitive Theory

Metacognition is influencing educational environments and making a tremendous impact on students in various age groups. College students are greatly affected, because the metacognitive theory suggests that to be successful, it is essential to increase the students' consciousness of themselves as learners, and to develop an aware, reflective approach to learning (Andre & Anderson, 1978-79; Palincsar, 1982; Wong & Jones, 1982). In other words, students must know the specific task as well as the type of relevant encoding activities to engage in, so that the activities will

enhance learning. These metacognitive activities develop with age and experience (Brown, 1985).

Many researchers and theorists have advocated that the active and strategic use of learning strategies can improve comprehension (Anderson, 1980; Weinstein, 1982; Rothkopf, 1981). Comprehension is a process in which the student brings a complex set of knowledge, prior experiences, and other factors and translate them into a meaningful message. According to Goodman,

> " ... (Reading) involves an interaction between thought and language. Efficient reading does not result from precise perception and identification of all elements, but from skills in selecting the fewest, most productive cues necessary to produce guesses which are right the first time, " (p.108).

To be conscious and to learn involve the students' awareness of what is needed to perform effectively to meet the demands in given tasks, identifying important parts of the texts and focus on these when learning. Baker and Brown (1984) suggested that any attempt to achieve reading comprehension must involve metacognition.

Metacognition is one's awareness and one's conscious control of one's cognitive actions. Certain researchers (Rumelhart, 1980; Anderson, Reynolds, Schallert, & Goetz, 1977) had further expanded on works done by Bartlett (1932) and Ausubel (1963) on prior knowledge to formulate the schema theory, which accounts for the way students learn, understand, and remember what they have read. Brown (1980) further expanded on metacognition to include cognitive

actions which she termed comprehension, cognitive monitoring and cognitive regulation. In other words students who are involved in cognitive monitoring throughout the reading processes, keep themselves on the right track and check themselves on comprehension failures. Once comprehension fails, cognitive monitoring is replaced by cognitive regulation. Cognitive regulation would decide which step to take to solve the problems according to the task on hand. The problem may be ignored if it is considered as insignificant and the reading process continues; if comprehension fails completely, efforts would be made to solve it by using appropriate strategies (Baker & Brown, 1984). These are the active use of metacognitive knowledge during reading.

Metacognitive knowledge includes "knowledge about cognition and regulation of cognition which involve the development and use of compensatory strategies" (Brown, 1985, p. 353). The author explained compensatory strategies as a variety of metacognitive strategies, such as, task recognition, sampling, selecting, inferring, predicting, confirming, planning and evaluating. Together, metacognitive knowledge and appropriate strategies will enable students to reach their academic goals. Brown further stated that good students plan and use strategy to meet the demands of the learning situation. This conscious coordination is metacognition (Brown, 1980; Baker & Brown, 1984) and its activities are metacognitive.

Metacognitive development is related to both age and experiences (Brown, 1980; Garner, 1987; Flavell, 1978). According to them, when students grow older chronologically, their added experience makes it easier for them to learn metacognitive knowledge and learning strategies. Students who do not already have the metacognitive knowledge need to be trained. Baker and Brown (1984) pointed out that college reading and study skills programs often failed because students are "blindly following rules instead of being conscious and learning to learn" (p. 10). In essence, those students who did not develop themselves as active agents and are unaware of their own cognitive activities will not learn. Baker and Brown (1984) stressed that college students who are older, able to plan ahead, monitor and evaluate will definitely achieve success.

Weisberg and Balajthy (1986) indicated that teaching students to recognize the text's structure has led to greater gains in students' comprehension. With the trend in reading to provide students with declarative (knowing that), procedural (knowing how), and conditional knowledge (knowing what) regarding learning strategies, educators will have to make efforts to exploit these services (Simpson, 1986, Bliss and Mueller, 1987).

Baker (1974) found that studying different subjects demand different approaches, especially in universities where all learning comes from independent reading. Because 85% of college learning involves independent reading, it becomes

necessary for students to know how to interact with texts (Baker, 1974). Students who are metacognitively aware of their abilities (strengths and weaknesses) will be able to transfer and solve their academic problems better. If the students can find a framework within which to fit new facts, their past experience, their expectancies, and their learning strategies then the students will advance in their academic careers.

Brown and her associates (1976. 1979, 1980, 1982, 1984, 1985) through extensive research concluded that many students have been victims of "blind training" because instructors did not explain to them during the instructional process the real significance of the targeted strategy, nor inform them about the when, where, and how to employ each strategy. Therefore, the students who are underprepared followed either a pattern of comprehension practice which is similar to those at lower levels (Durkin, 1978-1979) or a repertoire of strategies which are inefficient for independent learning (Simpson, 1985). The research studies also indicated that strategies do enhance learning if students are more aware of the strategic nature of reading and control the learning process (Brown, 1985; Simpson, 1986).

At the college level, reading to learn from texts forms almost all learning. Since some textbooks and instructors do not provide adequate learning strategy cues for students, many students are finding it difficult to cope with the college experience. Because effective strategies are based

on metacognitive awareness, students must be able to realize if they had understood the information they had read from the texts. At the secondary levels of education most students have developed their ability to read and learn from texts and printed materials. The ability to learn from texts is general reading achievement whereby students acquire information, vocabulary, and concepts. This ability often continues to develop throughout a person's lifetime (Bloom, 1971).

Singer and Donlan (1989) asserted that learning from texts is a process that is highly correlated with general mental ability. Students are more apt to paraphrase, summarize, anticipate test items, take notes, relate materials to prior and personal experiences, speculate and make inferences, visualize, and read with a definite purpose in mind if they are aware as well as able to reflect and regulate their own cognitive processes (Brown, 1982).

However, researchers also concluded that students entering colleges do not have a well balanced repertoire of effective independent learning strategies. Tierney, LaZansky, and Schallert's (1982) study found that students utilized a very restricted range of learning strategies. The subjects rarely used strategies when reading textual information, when they do, they often chose to memorize portions of chapters and complete instructor prepared questions and activities as their only method of study.

Simpson (1983) studied 395 first semester freshmen

substantiated Tierney's et al. study. Simpson found that these college freshmen utilized restricted or ineffective strategies and were reluctant to exchange their existing strategies for better and more mature learning strategies. Most students are not metacognitively aware of the activities involved in independent learning (Brown, Bransford, Ferrera, & Campione, 1982).

Some research concentrated on the important ways of how students can be actively involved in reconstructing information from text (Orlando, 1980). Activities which involve comprehension, reasoning, reading and evaluating have presently been recognized as metacognitive skills or strategies. The fundamental assumption of metacognition in the context of reading is that readers know about their own cognitive abilities and the compatibility between themselves as readers and the demands of all reading situations (Brown, 1985). The metacognitive abilities of regulation of cognition, are the self-regulatory mechanisms that students use during an ongoing attempt to solve problems. Baker and Brown (1984) noted that monitoring is a requirement in reading:

> Reading for meaning is essentially an attempt to comprehend, and any attempt to comprehend must involve comprehension monitoring ... Comprehension monitoring activities are implicitly, if not explicitly, incorporated into several recent models of comprehension. These theories view comprehension as an active process of hypothesis testing or schema building Readers make hypotheses about the most plausible interpretation of the text as they are reading and testing these hypotheses against the available information. (p. 355)

According to Baker and Brown (1984) comprehension monitoring is a part of comprehension related to the interpretation of the meaning of the text. However, Brown (1985) stated that the:

> " ... indices of metacognition include planning one's next move, checking the outcome of any strategy one might use, monitoring the effectiveness of any attempted action, testing, revising and evaluating one's strategies for learning,"

are essential skills and are age dependent. If the students can make predictions of what is going to happen next, they are more likely to foresee some impending problems; thus, they would be in a good position to adopt appropriate strategies to solve these problems.

Myers and Paris (1978), for example, compared two age groups of students who reported using a variety of strategies. They interviewed the students about their knowledge of person, task, and strategy variables related to reading. The students' answers to the eighteen questions showed that younger readers do not understand cognitive aspects of reading as well as older students. The older students had better understanding about strategies such as skimming, rereading, and paraphrasing and how to use strategies more flexibly under different conditions. Garner (1982) in a similar study found the results to be the same even though students are in higher age groups.

In 1984, Forrest-Pressley and Waller conducted a study which administered a wide battery of reading and cognitive tasks to 72 third and 72 sixth graders. The subjects were

divided into high, average, and low reading ability groups. The researchers measured the students' awareness about reading and cognitive performance. They found that the subjects' use of strategies and their ability to report their thinking verbally improved with age and reading ability.

Mitchell and Irwin (1985) investigated the reading strategies of 100 junior high school students. The groups consisted of 50 gifted and 50 non-gifted students. The criteria for gifted selection included IQ score of 130 and higher, the teacher recommendations, and parents verification of student giftedness. The researchers found that gifted students are more able to generate ideas and reorganize information in reading situations, they use a wide variety of reading strategies when compared to the non-gifted group.

Baker and Brown (1984) in several studies showed that children below the seventh grade had difficulty selecting main ideas from the texts by simply rereading, whereas college students underlined, summarized, took notes, and highlighted main ideas. They concluded that the development of strategies in learning are "late developmental skills because students require a fine degree of sensitivity to the demands of learning from texts". They also found that the students' awareness scores were significantly correlated with strategy use and recall performance.

Garner and Kraus (1981-1982) analyzed the correlations

between metacognition and reading. They examined the relation between students' knowledge of strategies and their reading performance. The students were grouped as good and poor readers. First, the students were interviewed about their knowledge of reading strategies. A couple of weeks later the same students were administered an error detection task to assess their metacognitive reading skills. The researchers found that there is a significant correlation between the students' knowledge of comprehension strategies and performance on reading awareness tasks. This suggested that good readers' responses indicated the importance of focusing on meaning construction as a goal of reading and described useful and appropriate strategies needed to obtain that goal. Students focusing on meaning as a goal of reading depends upon other factors such as organization of text, succeeding content, and previous background of students.

Some researchers (Myers & Paris, 1978; Garner & Kraus, 1981-1982) found that metacognition has been assessed by observing students' awareness of reading/comprehension processes in relation to text-processing strategies. Evidence for metacognition comes from interviews and open-ended questions which are used to assess students' reading goals, criteria used to evaluate their own reading, and the strategies they used to help recall information in the text, after reading and performing specific tasks.

Current metacognitive researchers view students as

active information processors, interpreters, and synthesizers using a large variety of strategies to learn from texts.

Reading, comprehension, and learning strategies are some of the complex variety of learning activities which students use to enhance their learning. Even though, some students may already have knowledge of learning strategies, not all students are proficient and spontaneous in using them when the situations arise (Simpson, 1986).

Simpson (1983) pointed out that students who want to improve their independent learning strategies should be taught how to analyze the variables that interact to affect their performances. The author provided four factors of an interactive model of independent learning:

1. Task characteristics. Successful learners structure and adapt their reading strategies to what they already know about the task. The more specifically students can characterize and define a task, the more successful their learning will be.

2. Text characteristics. Successful learners analyze the text they are to read because they realize that each content area, each author, and each textbook format places differential responsibilities upon the reader. They know how to fully utilize summaries, boldface headings and italicized words, relationship signals, and statements emphasizing particular ideas as important. They also are sensitive to the typical patterns of development, such as cause-effect, comparison-contrast, definition, and generalization- example.

3. Learner characteristics. Successful learners have a self-awareness of their own cognitive resources, strengths, and weaknesses. They draw upon their prior experiences and existing schemata to make unfamiliar textual material more meaningful. Most importantly, they have developed some self-regulatory mechanisms to facilitate their attempts to read, solve, and learn from text.

> 4. Learner processes and strategies. Successful learners have a well-balanced repertoire of cognitive and metacognitive strategies and processes they can appropriately employ and evaluate for a specific task from a designated text. Because they realize that the effectiveness of any study strategy depends upon how it is utilized and whether it meets the demands of the specific task, they carefully select and employ strategies to avoid a wholesale utilization of any on technique. (p.24)

According to Simpson (1983) such an interactive model would have an impact on the methodology of developmental education. This has lead to the growing interest in guided practice and transfer of control from teacher to student so that strategies can be self-initiated and generalized (Pearson, & Gallagher, 1983).

Raphael and McKinney (1983) conducted a study to teach students question-answer routines known as QARs. A group of teachers were trained to use the QAR technique and then taught the strategy for ten weeks to heighten 5th and 8th graders' awareness of explicitly stated or implied information in text. Students' comprehension improved significantly for 5th graders in trained condition, especially for those with low to average reading abilities. The researchers found that training teachers to deliver strategy instruction with regular and supplemental materials was valid and successful.

The current researchers (Brown, Armbruster, & Baker, 1984; Day, 1980; and Brown & Smiley, 1978) were able to conclude that young and poor readers often do not use effective strategies for monitoring and constructing meaning

from texts, but when taught the effective strategy they improved. These researchers also found that learning strategies serviceable for college students include: underlining (Brown and Smiley, 1978), note-taking (Brown & Smiley, 1978), comprehension, retention, and summarization (Day, 1980), text structure and thematic outlining (Armbruster, 1979), and self-questioning (Andre and Anderson, 1978).

Baker and Brown (1984) stressed that the poor learning strategies were traced to students' lack of awareness about effective strategies and inadequate knowledge of text features, but when students were trained to use strategies to a level where students were able to employ, monitor, check, and evaluate the strategies used, effective learning results. The close relationship of learning strategies, reading and learning makes it difficult to isolate them. Biggs (1985) argued that the automatic use of learning strategies allow students to be competent in selecting appropriate strategies to fit the task in hand. Baker and Brown (1985) pointed out that no matter what the reasons for their approaches to learning, students must be aware of their learning strategies if they want to meet the demands of prescribed tasks. Therefore, helping students to find learning strategies that fit their academic situation is likely to be more effective. Otherwise. college students' personal, intellectual, and social development will suffer from the pressures created by the use of relatively inefficient learning strategies, and

and lack knowledge in the reading and learning process (Dansereau. 1978).

Bartlett and Knoblock (1988) suggested that once learning strategies are brought to the metacognitive (awareness) level, college students will be able to monitor and regulate them according to the demands of the tasks. For example. King, Biggs, and Lipsky (1984) compared the effects of student-generated prequestions and summaries as strategies among college freshmen enrolled in developmental reading classes. Eighty-seven experimental students either received training in phrasing and answering questions while reading or in constructing summaries of text segments. A control group was also used. The results suggested that summary generalization is especially useful in studying for objective type tests. The group which was trained in summarizing had higher test scores than the control group. The self-questioning group, outperformed both the control and the summarizing groups in the objective test. The self-questioning and questions require thinking which enhances performances are better than those simply calling attention to main points of the texts. These training sessions served to reduce the tendency to practice improper learning behavior and discover strategies that have been effective to various learning situations.

Results of these studies suggest that students can be successfully taught to develop metacognitive skills (Singer

and Donlan, 1982; Palincsar and Brown, 1984). These studies showed improved comprehension of students after being taught to generate their own questions based on students' cognitive knowledge of the learning processes. The results suggested that the treatment group included significantly more major information in their summaries, although the inclusion of minor information did not differ between treatment and control groups. They also found comprehension level improved when students and teacher took turns "teaching" information from passages by way of summarizing, questioning, clarifying, and predicting. These studies indicated that learning strategies and the ability to use, monitor, check and evaluate the learning strategies employed are most successful to performance.

Schema Theory

The reading comprehension process depends on the interaction of many factors. Among the internal and external factors are person (learner), text, task, and strategies. Although the reader and the text represent the major factors, reading comprehension is viewed by reading researchers as an active process of hypothesis testing or schema building. Previous research has shown a relationship between prior knowledge and knowledge of text structure also do influence comprehension (Afflerbach, 1986). Singer and Donlan (1982) stated that although schema theory

has been much applied in reading comprehension research, tying it with learning strategy instruction to improve students' processing of text is fairly recent. A number of empirical investigations have produced findings that appear to support this theory (eg. Bradford & Johnson, 1973: Anderson, Reynolds, Schallert, & Goetz, 1977).

Schema is a cognitive structure or organization of the knowledge students have related to an idea, thing, or concept (Anderson, 1977). Schemas are derived from students' experiences or background. Therefore, the schema theory proposed that when reading text, the readers use their prior knowledge and the context of the situation to interpret and recall new information. In relation to reading the fundamental assumption of the schema theory is that written text does not in itself carry meaning. A text provides direction for the readers as to how they retrieve or construct the intended meaning from their own previously acquired knowledge or experiences (Anderson, 1977). This indicates readers activating the schema. Words in the text evoke associated concepts, interrelationships, and potential interrelationships. Schema are, therefore, forms of control processors that determine comprehension of information. In addition, Bartlett (1932) referred to schema as "an active organization of past reactions or past experience" (p.201).

A "schema" is a model of knowledge gained from a person's experience of a situation or event. Educators must guide students to think about the interconnections among

ideas as they read, since low prior knowledge students need text structure clues for aiding their comprehension. The "active organization of past reactions or past experience" is the constructive character of remembering in a learning situation (Anderson, 1977). Bransford (1979) had argued that information can be processed at different levels, and that the deeper the level of processing, the more likely it is that the information will be retained in long-term memory.

Bartlett (1932) first introduced the basic idea of schema in accounting for changes in the memory of students over time as tending to be more approximate to the familiar. The importance of prior knowledge in reading has been well documented (Anderson, 1977; Anderson & Pearson, 1984; Rumelhart, 1980). Research on adult schema effects on understanding and learning from text came from a series of studies form the Center for the Study of Reading at the University of Illinois, Urbana. Researchers from the center like Anderson, Reynolds, Schallert, and Goetz (1977) found that adult subjects used their background experiences and life situations to process text materials. Since words typically occur in contexts examples in sentences, labels, on signs, and others; students have greater understanding of what the words mean, because they are reading for meaning. The organization of the text helps readers to select among these conceptual complexes. Thus, schema determines how readers' knowledge interacts and shapes the information on the page and determine how that knowledge should be organized

to support the interaction. This results in learning. With their ability to activate their prior knowledge, monitor their comprehension and retention learning is improved (Brown, Armbruster & Baker, 1984).

Anderson (1985) explained that "comprehension is a matter of activating or constructing a schema that provides a coherent explanation of objects and events mentioned in the text". To understand comprehension, there is a need to focus on the relationship between the text and the reader's immediate cognitive-perceptual situation. The reader's cognitive-perceptual situation is the mental formation the reader has while reading the text. Comprehension in this instance is the result of the interaction between the text and the immediate situation that the reader is in or the task he has to perform. Then, schema is viewed as the construction and reconstruction of experiences of students, it is a model of knowledge gained from experience, where each students' experience of a situation or event will be different.

This was illustrated in a series of experiments by Bransford and Johnson (1973). They explained that "comprehension results only when the comprehender had sufficient linguistic information to use the cues specified in the input (text) in order for him to create some semantic context that allows him to understand," (p.246). For example, in one experiment, a group of subjects were given a passage concerning a young man's use of balloons to attract

a young woman living in a high-rise apartment. Upon reading the passage with no context provided, the subjects could remember little of it. The subjects rated this passage very difficult to understand. Another group of subjects were shown a picture (a) figure 1 before reading the passage. The researchers found that the subjects could comprehend and remember the passage easily. The third group of subjects who were shown the (b) picture in figure 1 remembered no more than the first group that did not receive the picture. The researchers concluded that what is critical for the comprehension is a schema accounting for the relationship among the elements. Bransford (1979) also argued that prior knowledge must be activated "in order to facilitate one's current abilities to understand and learn (p. 135).

Baker and Brown (1984) stated that when students read they form hypotheses against the information from the text. If no reasonable hypotheses are reached, comprehension fails. The authors concluded that these hypotheses are metacognitive skills and that these skills are often unconscious efforts after certain level of autonomy has been achieved. However, Gambrell and Heathington (1981), compared 28 adult poor readers in a Right to Read Academy with 28 college students. These authors found that the low literate adults' awareness about reading was comparable to 8 or 9 year old children. Their results suggested that reading level metacognition is more closely related to reading

skills than to chronological age. Baker and Brown (1984) attributed the increase in students' achievement to the control of the cognitive activities they engage in as they read and learn.

Whimbey and Whimbey (1975) found that a large percent of high school students who had reading difficulties have comprehension problems resulting from their inability to follow, interpret and answer questions efficiently. Kintsch, and Van Dijik (1978) stated that text referential and semantic coherence cannot be on the text only because of the limited working memory capacity. The readers need to understand that the processing of the text is under the control of schema. Kintsch, and van Dijk (1983) explained that learning strategies are essential tools to reading comprehension because they "pertain to a global way of deciding in advance which kinds of action alternatives will be taken along a course of action" (p.77). They suggested that for students to achieve understanding of the text, even though a particular specific task determines its level of understanding, the students need to possess both the ability to apply effective strategies, and then self-evaluate its effectiveness.

Metacognitive researchers suggest that readers' successes differ as they read from different content areas as a result of the complex interaction between the text and the learner (Armbruster, Echols, and Brown, 1982). They pointed out that successful reading is dependent upon:

> the text (its difficulty and structure, the interest and familiarity the reader has with the text); storage and retrieval requirements of the task to be performed; strategies the reader utilizes to store and retrieve information from the text; the learner characteristics including the reader's ability and motivation (pp.54-55).

However, the literature on previous knowledge (Schemas) is mixed with that of whether making readers more aware of what they know before reading informational text will lead to an improvement in their comprehension of the text. Lipson (1983) reported that the quality of the reader's existing background knowledge must be considered. Hynd and Alvermann (1986b) found that the students who read refutation text performed better on the two comprehension tests (short answer and true/false) than did those students in the nonrefutation text groups. The authors explained that students who generally have difficulties in learning from text, may benefit from text that explicitly points out incongruences. When the students are aware of the incongruences they are more likely to modify or correct any misconceptions they have as a result of reading the text (Kinstch & Yarbrough, 1982).

Metacognitive Strategies Training: Using Different Types of Text

Learning is very much dependent on that prior, existing knowledge and being strategic. Bransford (1979) suggested that what learners do with newly learned information influences what they remember. Students learn these

factors do not operate in isolation but, instead, interact in complex ways to influence learning and remembering.

In recent years, studies have shown that metacognitive strategy training can improve reading comprehension. In 1987, Dewitz, Carr, and Parberg trained students to use various strategies to improve inferential comprehension. The students were divided into four groups, one control and three treatment groups which received special instructions. Group one was taught to use structured overviews to identify key information and hierarchial relations in text. Group two was instructed to combine both their syntactic and semantic knowledge to insert appropriate words in cloze passages. These students were also taught to use a self-monitoring checklist to help them to evaluate their answers. Group three was trained on both the structured overview and the cloze procedures. These three intervention groups were compared to the control group which only received vocabulary instruction and supplementary activities.

The training sessions took place during 40-minute social studies classes spread over an 8-week period. The researchers found that the cloze procedure was significantly superior to the structured overview in promotion inferential comprehension. The results suggested group two which received cloze strategy training had higher metacognitive scores and the students were more aware of the correctness of their answers. The researchers argued that inferential comprehension can be improved by increasing students'

awareness of the relation between prior knowledge and the cues provided in text.

Ausubel (1968) explained that meaningful learning incorporates the new knowledge into the existing cognitive structure of the learner. Another study by Annis and Annis (1982) found that as students grew older they tend to use a large variety of learning strategies. According to the findings, 60% of the students from grades six to eight used "read only" strategies compared to 47% in grades 10 to 12. with only 13% utilizing the same strategy at college level. The popular strategies used by college students were found to be reading, rereading, underlining, summarizing and note-taking from text.

Even though college students have a repertoire of strategies, studies by Tierney, LaZansky, and Schallert (1982), and Simpson (1983) showed that students tend to have an over reliance on a single particular strategy for most tasks regardless of the type of text. Studies have also concluded that students of different reading ability levels tend to use the same strategies to gain meaning regardless of content area (Anderson, Spiro, & Anderson, 1978; Goetz, 1984; Guzzetti, 1984).

Day (1986) conducted a series of studies in which Junior College students were taught summarization skills. In these studies the students were taught rules for writing a summary. Explicit and direct training such as modeling how to mark text, delete irrelevant and redundant information.

and to underline important ideas were provided. The author documented a significant relationship between training and comprehension because of the importance of integrating explicit training with self-management skills.

Biggs (1985) maintained that helping students to become aware of their learning would improve students' schema. And at the same time teaching them a repertoire of strategies to choose from will enhance their learning since learning is related to schema.

Howe (1987) suggested that "newly acquired cognitive strategies and new learning skills must become habitual if they are to be fully utilized: care is needed to ensure that there are sufficient opportunities for repeated use" (p.144). His study pointed out that consistent use of the new strategies learned are important to the students.

Smith (1982) contended that some teachers had not trained students to "take charge" of their own learning. Teachers need to share planning, monitoring, and evaluating roles with their students to ensure the transfer of learning from teacher-controlled to student-controlled. When students have learned to control their own learning they will engage in deliberate, planful, conscious learning, then these students will ultimately assume responsibility. These studies pointed out that students who are aware of their own learning potentials are more influenced by attending to strategies and interacting them in such a way that they are related to the existing organization.

The review of literature so far suggests the following: 1) metacognitive development differs among all levels of students and all age groups. 2) metacognition tends to improve with age and develops more adequately with appropriate instruction. 3) College-level students seem to demonstrate some of the metacognitive skills but may possess deficiencies. 4) Some of the specific strategies to aid text mastery are skimming, scanning, note-taking, summarizing, previewing, outlining, signal words, selective questioning, and application.

The Relationship Between Reading Comprehension and Text

Reading comprehension is the reader's understanding of a text. The proper understanding of the text requires a mental representation of what has been described in the text, then select main points, and drawing inferences, and take planned activities to ensure that the material is comprehensible and memorable. Despite the layman's concept that comprehension is just reading the text for information, studies have proven that without the ability to construct internal representation which correspond to the text, a reader will not be able to retrieve much information for recall (Anderson & Pearson, 1984; Taylor, 1980).

Even though comprehension was described by Bloom as one of the lower levels of understanding, it is understanding and communication and making use of text materials that lead

students to achieve learning success (Bloom, 1965). Currently, the planned activities are termed as comprehension strategies which Tierney and Cunningham (1984) defined as "those cognitive activities which good readers engage in to foster comprehension. Students are viewed as active participants who are involve in a transaction between the mind of the reader and the language of the text" (p. 8). The kind of decision-making required after reading is the selection of ideas that will be incorporated in the students for long term memory. In the process of constructing, deleting, generalizing, and making inferences on the text, the students also need to generate new texts based on their comprehension of the text read.

Hare (1981) studied college students' awareness of their learning strategies using passages which required high and low prior knowledge. She found that the ability to discuss reading problems and strategies, the quantity of comprehension monitoring comments, and the number and kinds of strategies used were all associated with reading proficiency. In addition, Frank Smith (1979) argued that "comprehension is essential for learning and learning is the basis of comprehension". He strongly suggested that comprehension and learning cannot be separated.

Kieras (1982) used the "Given-New Strategy" a problem-solving approach, to show that readers compute the relations between propositions. Propositions are the basic units of meaning which express essentially the immediate content of a

passage (Kintsch, 1974). Reading is processed by the reader linking what is new with what is already known. Kieras showed that when the subjects were asked to recall the passage read, only the "macropositions" were retrieved. The subjects made certain hypotheses of what the passages were about. Then they made use of their previous knowledge to either accept or reject incoming "micropositions". The researcher found that it was easier for the readers to process and retain in memory a proposition that was built up from old, already familiar element than to process propositions which introduce new concepts into the text. Therefore, the authors concluded that what students know about a topic greatly influences how well they comprehend and remember what they read.

In addition, Anderson (1984) stated that reading comprehension is to be considered an interaction of the individual reader's expectations with textual information. The interaction of the reader and text to obtain the information is "the initial focusing of attention, the subsequent encoding, of the information attended to, and the retrieval of the information as required by the criterion task" (p. 220).

Bloom (1965) formulated a taxonomy of hierarchial levels: (1) Knowledge (2) Comprehension (3) Application (4) Analysis (5) Synthesis (6)Evaluation. Interestingly, Bloom asserts that simple behaviors build on others to form more complex behaviors. Cognitive psychologists believe

that cognitive structures must be taught to students along with content so that students can understand content better.

However, John Naisbitt (1982), author of Megatrend said that in this information age, it is important that education emphasize thinking, learning, and creating. For example, students should be taught how to think, how to learn and how to be creative. It is insufficient for educators to teach students content, facts and figures. Naisbitt asserted that students must be taught how to study so that they can take responsibility for their own learning (Naisbitt. 1982). Similarly, Whitt (1980), found that stress on specific skills, especially comprehension skills, during instruction, would improve proficiency level in college students.

Garner and Alexander (1981) in a series of studies using short passages, asked students to assist in editing the passages and to rate them for comprehensibility. In the 1980 study, some passages contained "intrasential informational inconsistencies": some contained non-meaning-changing polysyllabic words. They found that poor comprehenders identified the inconsistencies to be interfering with comprehension. In another study, Garner and Kraus (1982) found that poor comprehenders were unsuccessful at finding inconsistencies in the passages. The good comprehenders were successful at finding the inconsistencies. Readers who do not comprehend well tend to be less aware of their lack of understanding, and assume that most texts make little sense or are too difficult for

them.

Supposedly, college students are accomplished learners who can cope with the fact that words have different meanings in different contexts and they can use this knowledge to acquire information (Anderson, & Armbruster. 1984). In addition, the importance of self-awareness and self-control during learning was recognized especially in college students. These abilities are necessary to enhance learning. Reading comprehension is therefore an essential activity for anv learner in college.

In 1976-77, Olshavsky, studied comprehension strategies used by both good and poor students to comprehend and to solve problems in tasks. Readers were asked to read passages aloud, stopping at frequent pre-determined and cued points to think out aloud about what was going on in their minds as they attempted to comprehend these passages. He found that both good and poor readers used the same kinds of strategies, but good readers indicated that they used them more often. In 1978 he repeated the investigation of strategies for comprehension and monitoring using materials of increasing difficulty. He found that neither the good nor the poor students employ more strategies as the material difficulty increased. He concluded that students do not change strategies when text becomes more difficult.

More recent observations of readers' use of strategies, had revealed that good readers tend to use the most effective strategies to enhance text processing. Garner

and Alexander (1982) investigated college students' anticipation of questions as a strategy approach. They found the students who stated that they used this strategy to anticipate the question performed significantly better than those who used other strategies such as rereading, adjusting reading speed, and focusing on details. Andre and Anderson (1978-79) pointed out that students who self-question seem to do better and that poor students used less self-questioning. However, when poor students were taught how to self-question, their recall was as high as that of the good readers.

Similarly, Palincsar (1982) developed a program of corrective feedback and reciprocal questioning. Then she asked students about the text read, explained the correct answer and showed where it could be located in the text. The students are then encouraged to ask questions and when necessary she modeled the questions. When the student learned how to ask questions, their comprehension improved from an average of 15% to about 80% correct. These researchers concluded that self-questioning is an effective strategy in learning.

In college, recall of information is often demanded, both verbatim recall (as in definition /vocabulary in test items), and summary recall (when students are required to summarize/reconstruct essential meanings of a text). Since strategies are introduced to students by instructors at all grade levels, certain considerations need to be taken into

account. The learners' characteristics such as their background knowledge, text materials used, and the task are all important. Since reading is basically locating and extracting meaning at higher levels, college students are required to be highly proficient at constructing overall meaning and are adept at finding meaningful elements in text. Brown and her colleagues have done many studies of differences in the sensitivities of good and poor readers to major idea units (Brown, 1981). They found that students' responsiveness to major ideas develops slowly and late. In addition, they asserted that the capability to summarize also develops late for students.

Brown and Smiley (1977) studied students ages 8, 10, 12, and 18 years old. These students were asked to rate the ideas of complex stories according to their importance to the theme of the passage. Their task included sorting each idea in the story into one of the four groups ranging from least important to most important. The authors found that the 18 year olds could distinguish four levels of importance to the theme. The 12 year olds assigned lowest scores to least important and higher scores to most important elements, and were not able to differentiate intermediate levels of importance. The 10 year olds could distinguish the highest level of importance from all other levels. At 8 years old the subjects could make no reliable distinctions between levels of importance. Subjects were asked to read and recall another story, after the rating task. They found that at all

age levels the most important ideas were most often recalled. while the least important ideas were seldom recalled. The authors concluded that even without conscious awareness of the importance of ideas, younger children still favored the important information in recall. Similarly Brown, Campione, and Day (1981) found that more experienced students were able to abstract the significant portions of text into summaries, whereas younger students produced summaries containing a mixture of major and minor points. The students' recall of information were mixed in younger children.

These findings supported the fact that students differ in age and ability in processing text and whether or not comprehension has been achieved. When students are able to successfully identify and show that they have been reflecting upon their comprehension and making judgements on their reading progress, they have done activities which are integral to metacognition.

Learning Strategies

Weaver (1977), provided a distinction between skills and strategies, she emphasized skills as techniques for identifying words and strategies as techniques for getting meaning. Reading is viewed therefore as an attempt to help students learn how to learn. Students are also required to know the processes of learning, learning strategies, and the ability to control and regulate strategies in order to learn efficiently (Baker & Brown 1984).

Both reading and learning from text materials is demanded in college, so students must be able to choose strategies that aid recall of information to meet the goals. Learning strategies are defined as "techniques, principles, or rules that will facilitate the acquisition, manipulation, integration, storage and retrieval of information across situations and settings" (Alley and Deshler, 1979; p. 13).

Weinstein and MacDonald (1986), stated that the effectiveness of intentional learning depends largely on the learner's knowledge about his/her own learning, and his/her ability to control the learning process. This concept of learner's knowledge about the learning process originated from cognitive psychology. Weinstein and MacDonald further defined learning strategies as "the type of thoughts and behaviors, as well as the processes used to create, implement, and monitor them" (p. 258). The authors classified learning strategies into four general categories:

1) Knowledge acquisition strategies,
2) comprehension monitoring strategies,
3) active study strategies, and
4) support strategies (p. 258).

According to Weinstein and MacDonald (1986) knowledge acquisition strategies are those techniques which include the organization and elaboration to make incoming information more meaningful. Those strategies enable the students to build upon the information they know or had learned to new

information, able to make inferences, draw conclusions, imagery and relating units into an organized whole.

Comprehension monitoring strategies are those that learners' use whenever they are acquiring information from reading. The strategies are employed if comprehension fails. Active study strategies are mainly employed when recall of materials are important in learning. Strategies are used so as to aid the memorizing and recall of the materials. Support strategies are used to aid learning in general, such as place of study, attitude towards tasks, and time management abilities (Baker & Brown, 1984; Weinstein & MacDonald, 1986; Weinstein, 1987).

Effective learners should know their own strength and weakness of their learning, and the effectiveness of the strategies used. Cognitive psychologists emphasized that students must know how to interpret incoming information from the text materials then respond to what the task demands using appropriate learning strategies. This concept could be generalized to mean that college students may be successful according to how effective their learning abilities are. Therefore active intervention is needed in order to learn from the text. To achieve more complete memory of the text, the college student must engage in active learning strategies to ensure increased attention on important materials which are not retained automatically, especially extended texts in college (Brown, Smiley & Lawton, 1978; Brown, 1985; Weinstein & MacDonald, 1986).

Reading programs which teach metacognitive learning strategies should have an impact on the academic success of college students. Research supports the idea that efficient use of varied learning strategies are very important in the world of education (Annis & Annis, 1982; Weinstein & MacDonald, 1986). Nist, Simpson, & Hogrebe, (1985) reported that college reading programs have long been criticized because the emphasis is placed only on the instruction of isolated reading and learning strategies, with insufficient transitional practice in the learned strategies. Weinstein (1987) pointed out that educators can foster the development of effective learning strategies and help the students who are less skilled in the use of strategies. This would involve educators teaching learning strategies while teaching subject content knowledge. The students then can take active roles examining, manipulating, and if necessary modifying the strategies learned so as to tailor them to their individual needs.

Initially, educators need to provide as much feedback and practice as possible so that the students can learn to take responsibility for their own learning. Training in learning strategies at lower levels in schools obviously is insufficient because of the heavier learning challenges facing college and university students.

Rote Versus Meaningful learning

Historically, programs in learning strategies had

concentrated on teaching strategies for enhancing recall of information per se. These were known as rote-recall strategies. The most popular learning strategies of rote-recall are rehearsal, categorization and elaboration.

Rehearsal is the repetition of items to ensure that they are memorized. This strategy does not demand any understanding of the significance of the text. The rehearsal strategy requires the learner to repeat units of the text until they can be remembered word for word.

Categorization strategy enhances the recall of any material that is familiar to the learner and is used to design a plan for learning. Elaboration is a strategy where the learner imposes meaning strategy where the learner imposes meaning on the material to render it more comprehensible to him.

Current research (Garner Alexander, 1982; Goetz & Palmer, 1983; Hayes & Diehl, 1982; Palincar & Brown, 1984) in learning strategies has shown that students better understand the significance of learning when appropriate training, is provided. Rote-recall strategies such as categorizing and elaborating are typically used because at the college level, more information is presented than can be remembered. Therefore, successful students must identify information that is important or that will be items on tests. While most rote -memory strategies involve mindless repetition, categorization and elaboration strategies require conscious and deliberate effort.

Summarizing and Outlining

Summarizing is considered a strategy for understanding and learning. Summarizing assumes that readers, when comprehending a passage, forms a representation of the passage (Kintsch & van Dijk, 1978). Similarly, students who are able to self-test their comprehension and retention of the materials learned, often attempt to summarize the material they had read. The summary has been assumed to represent what the students have understood about the text. Summarization also provides students a good way to estimate their preparedness for tests while studying is still occurring. It forces learners to use in-depth processing of the more important ideas in the text.

Winograd (1984) also studied students' knowledge of summarizing. He found that good readers have a better understanding of the characteristics of good summaries. Brown, Campione, and Day (1981) found students using different rules when summarizing. The general rules include:

(1) deletion of irrelevant or trivial information;

(2) deletion of redundant information;

(3) selection of topic sentences;

(4) substitution of a super-ordinate term or event for a list of terms or actions;

(5) invention of topic sentences when none is provided by the author.

The authors indicate that there is a clear developmental trend in the awareness and use of these rules. They also suggest that teaching students to use the rules during reading requires explicit instruction.

Ryan (1980) studied the effects on the achievement of students who were using summarizing and paraphasing strategies. He found that students who tended to view knowledge as a set of isolated facts and answers earned lower grades than those who viewed knowledge as an organization of facts and concepts. Students who viewed knowledge as an organization of facts and concepts were more likely to seek relationships among sentences and subheadings. This study suggested that successful students do more than merely trying to retrieve textbook propositions.

Similarly Long (1985) found that college students who earned high scores on a test covering expository information relied more heavily on interactive strategies than did those students who scored less. Long defined interactive strategies as those that involved acting on, transposing, or personally interacting with the material under study. Interactive strategies are anticipating what might be on tests, paraphrasing the material, taking notes, summarizing, and relating material to personal experiences. The author found that successful students combined strategies and used more than a single method to enhance comprehension.

Goodman and Burke (1980) stated that learning strategies increase students' awareness of the language and

clues during reading, and helped learners to focus on aspects of written language that are not being processed effectively by the students. Students can be taught to be aware of what and how they learn in relation to specific tasks.

Baker and Brown (1984) compared young students to college and older high school students in their performance on summarization skills. The authors found that college and high school students out perform younger students in their ability to plan, in their knowledge of text, and their ability to condense the materials read. The authors concluded that the ability to summarize is a late developing skill that learners continue to refine throughout their lives.

Brown and Day (1984) reported the use of summarization by both novices and experts. The novices were junior college students who did not have any reading or writing problems. The experts were fourth year graduate students in English who had taught rhetoric classes. The novice students were provided training in the summarization strategy which improved their performance of tasks.

Weinstein and MacDonald (1986) stated that when students are given the opportunities to learn and to use alternative learning strategies the advantages are two-fold. Not only do students become more efficient in using their repertoire of learning strategies but are aware of their cognitive capabilities which encourages interpretive thinking and application before and during their performance on required

tasks (Taylor, 1980; Horowitz, 1985).

Furthermore, studies by Brown (1981); Meyer (1982): and Rosenblatt (1978) have also recommended writing as a useful strategy. Having students assimilate new information by writing about it is helpful. Writing allows students to ponder, reread, svnthesize, and organize the information read (Brown & Day, 1983; Smith, 1982). Therefore, summarizing, paraphrasing and precis writing are good techniques that enhance the assimilation and integration of information. In conclusion, all researchers agree that for students to attain learning strategies the above mentioned skills are necessary if there is collective, institution-wide commitment to do so.

Bruner, Goodnow, and Austin (1956) studied and developed procedures to identify strategies used by students. The study showed that there may be a differential effect for the attainment of different concepts required by different learning tasks.

Text Structures/Thematic Organizers

Subject matter materials are mainly written to provide meaningful information to learners. The purpose of text structures or organizers build and activate learners' background knowledge, provide cues, and focus attention typically before reading. Mainly, text structures prepare students for reading by drawing on their prior knowledge. It also helps students to relate what they know to what they are learning (Ausubel, 1968). Students' ability and use of

text structure is an important aid to their reading comprehension (Meyer, Brandt, & Bluth, 1980; Taylor, 1980).

Text structure organizes the information in set patterns, for example, descriptive, compare/contrast, or sequential. If students are able to identify the pattern they can use it as an outline to organize their understanding of the text. However, poor readers are not able to extract major ideas on the topic. Writers of texts organized their materials in structured ways so that the students can determine the text structure to better plan their learning activities (Meyer, Brandt, & Bluth, 1980). Students who are aware of the text structures would be able to extract meaning from the texts. Langer (1982) stated that text is:

> ... merely a blueprint using a linguistic code; readers must use the blueprint to stimulate their own ideas and create their own meanings...the meanings that the author intended, but reader-generated nonetheless (p. 41).

Meyer (1982) suggested that students need to be made aware of the text organization. For example, major text structure like cause-effect, comparison and contrast, listing or enumeration, chronological order, generalization with supporting evidence, description, and question and question and answers. The author found that the use of signal words was particularly important for average students, who were able to recall more information from the text when signal words were present. However, the deletion of signal words does not affect the recall of good students.

Meyer concluded that for a large number of students, providing the experience with and understanding of signal words clearly increases their ability to comprehend. Meyer, Brandt, and Bluth (1980) argued that students of all ages have trouble comprehending the structure of expository text because they were generally not taught to recognize and use expository structure to improve their reading comprehension. Teachers mostly taught content using their own organizational patterns/structures. The researchers contend that most younger students are explicitly taught narrative structures because the texts used are mainly of the narrative format (van Dijk, 1980). Contrary to this, Alvermann and Hynd (1989) found that high school students who read an expository science passage did better on posttests than students who read the same information embedded in the narrative structure.

Research conducted by Meyer and others (1980), however, seemed to indicate that certain organizational structures do have a greater facilitative effect on recall than others. Schnotz (1984) had suggested however, that it is not certain that structure will produce better recall of text, but rather that different structures will result in different types of text information. He found that structure of the text could have a differential effect on the recall of specific text ideas because high school students who read an expository science passage did better on posttest than students who read the same information which was embedded in narrative

structure. The researchers also found that subjects who received direct instruction in summarization rules did better and improved the quality of their summaries.

Weinstein and Mayer (1986) suggested that direct instruction is important if instructors expect students to transfer the strategies learned in a college reading class to regular courses. Students must have the opportunity to apply their learning strategies to other courses.

Note-taking/Underlining

Weinstein and Mayer (1986) viewed notetaking as a complex task that is effective when it allows time for students to select and practice learning strategies. The authors found that note-taking and underlining are often used by college students to emphasize major points in learning. Good students are able to discriminate what is deemed important and what is not. Research had focused on comparing subject-generated underlining with instructor-generated underlining (Hartley, Bartlett, & Branthwaite, 1980). They found that when students generated their own underlining they seemed to do better than when they have the underlining done for them. Similarly, Brown and Smiley (1978) found that students who spontaneously underline and take-notes while studying tend to focus in important elements of the texts which resulted in superior recall, while students who were not consistent in the strategies had inferior recall. Other studies also compared underlining with other study strategies

(Johnson & Wen, 1976). These studies suggested that students who generate their own underlining tend to increase recall over those who only interacted with instructor-generated underlining. Improved recall in student-generated underlining was attributed to the levels of processing.

The processing theory states that information which is processed at deeper levels through elaboration is better remembered. Students interact with text while they are underlining actively, hence using underlining as an encoding device. If students underline merely as a concentration technique it would be of little value for learning. Students who read, comprehend, then underline or take notes on the materials read using their prior knowledge of the topic will enhance their learning. Thus, some theorists believe that differences between text-types do explain significant differences in the way texts are processed (Bruner, 1986; Meyer, 1977; van Dijk, 1980)

Nist and Hogrebe's (1987) study found that students who used underlining merely as a concentration technique, saw little value in the strategy. The authors used sixty-seven college freshmen who were randomly assigned to five experimental groups. Four groups had experimenter-generated underlined passages and the fifth group generated their own text markings. The subjects had two sessions, where they took a test of prior knowledge, read the assigned passage, and took a 24-item multiple choice test consisting of 24 questions. The subjects who generated their own underlining

did not perform significantly better then those experimenter-generated underlining. The authors concluded that if students are trained how to underline it will lead them into deeper levels of text processing, which will result in better retention of the text to be learned.

Efficient note-taking, similar to underlining will only occur when learners have sufficient control and are aware of the text structure of the materials read. Underlining is similar to note-taking except that students may use highlighters to underline the text. Here the students are able to skip the minor details and unimportant information from the text.

Types of Text Used

Text Types

Text types are labeled as discourse, genres, or superstructures which describe major categories of discourse such as expository and narrative. Reading research has currently investigated the effects of text type on what the students learn and retain (Meyer & Rice, 1984). Rosenblatt (1978) defines text as "a set or series of signs interpretable as linguistic symbols. These symbols become words by virtue of their being potentially recognizable as pointing to something beyond themselves." According to Rosenblatt (1978) the readers relationships with texts is a "series of gradations between the nonaesthetic and aesthetic

extremes." Aesthetic reading is literary reading. In it the reader's attention is directed toward what happens during the reading, the feelings and attitudes aroused in the imagination. Nonaesthetic reading is referred to the reader's acquisition of information or to solve problems. The acquisition of information from texts can be problematic if college students have difficulty comprehending them. Students have to read with understanding and apply critical insights to the variety of printed sources that accompany academic course work. Then these students have to synthesize the new knowledge with previous knowledge and adjust their thinking accordingly. Dewey (1910), for example, was aware that reading involves the metacognitive skills of planning, checking, and evaluating activities. Although the term metacognition is new, the idea of the type of knowledge to which it refers has long been recognized.

Rothkopf (1982) provided four conditions which are necessary for success in learning from text. He stated that two properties are text related and two are reader related. Text must contain all the information the reader needs and it must be well organized and written clearly, in logical order. The reader related conditions are stated as the reader's ability to abstract needed materials from the text, and then able to deal with the relevant portions so that sufficient information can be absorbed. Rothkopf (1982) also demonstrated that the goal for which a text is read influences "how much of what" is remembered. Retention

diminishes with the increase of the number of goals.

Educators need to be aware that both reading strategies for specific kinds of texts and the characteristics of the given text influence learning. Research (Bransford, 1979; Rumelhart, 1980) on Schema theory has shown that the structure of text affects the amount of information students remember. Text which has clear organizational structure and hierarchially related components are easier to remember.

Text, therefore, refers to how the ideas are interrelated to convey a message to the reader. Some of the ideas are of importance to the message presented while others are there to make the logical connection of ideas and the subordination of some ideas to others. Some students have no knowledge that writers of text convey information in a meaningful, organized way. Learning from texts is not an automatic process. According to Brown (1982) text is meaningful only when the learners have strategies to extract and interpret the information.

Rosenblatt (1978) said that creating meaning is an "active, self-ordering, and self-correcting process." Therefore, knowledge of text structure is important in learning as it enables the learner to engage in self-questioning to make sense of the text. Furthermore, acquiring academic information is dependent on the students' ability to define purposes for reading and to balance what is already known and what is to be learned. Educators have often assumed that college students have developed that

ability and that they need no further instruction. However, this is not so, because research have shown that many students can read and literally comprehend the textual cues, but cannot move beyond the cues to creative interpretations (Moffett, 1968; Smith, 1974). In college academic courses, especially at freshmen levels, students can be helped to develop this ability if instructors use strategies that teach students to make connections between prior and present learning.

Text Structure: Narrative - Expository

The basic forms of writings can be broadly divided into descriptive, narrative, expository and argumentative discourse. As previous research had suggested certain aspects of text structure do influence the amount and type of information learned (Ruemlhart, 1975; Kintsch, 1976; Thorndyke, 1977; and Meyer, 1978). Narrative writing functions to tell or narrate an event. Its subject matter is mainly people and events which it organizes in space and time.

Thorndyke (1977) described the structures typically found in narrative text to encompass that of a setting (characters, location, time), a theme (events, goal), a plot (episodes), and a resolution (event or state). Longacre (1976) explained that narrative text differs from expository text in person, orientation, time, and linkage. Brewer (1980) pointed out that narration consists of a "series of

temporally occurring events" that have some causal or thematic ties while exposition linguistically represents "underlying abstract, logical processes" (p. 223). According to Brewer both narrative and expository can be used to inform entertain, persuade, or provide aesthetic pleasure. In addition, narrative is agent-oriented while expository text is subject matter oriented. In order to accomplish time, the narrative text either uses the past or the historical present but in expository text, time has no temporal focus.

Expository text is a "discourse designed to convey information or explain what is difficult to understand" (Webster' Dictionary, 1980). Its function is to inform or to instruct, to present ideas. Its subject matter is ideas and generalizations. Therefore, expository text uses various tenses, depending on what is most appropriate for the subject matter. Longacre (1976) concluded that in expository text, sentence topic and parallelism provide the transition and smooth flow of the subject matter whereas the narrative text depends on chronological linkage. He also states that students should be aware that there are similar features in both narrative and expository texts (eg. setting, theme, plot, and resolution). Text patterns may be used as a strategy for understanding and studying new information, for organizing information in memory, and for retrieving information.

Mandler and Johnson (1977) had explored into detail what they refer to as "story schema", using this term to refer to

"a set of expectations about the internal structure of stories which serves to facilitate both encoding and retrieval". They demonstrated that the influences upon recall of text in terms of the story schema, were present in a majority of readers, even younger ones.

In 1980, Meyer, Brandt, and Bluth studied about readers' use of text patterns. They found that ninth grade good students were aware of and used the structure of text to comprehend and organize their recalls. However, those who were not aware of text structure did not use it in recall. The study indicated that while the structure of text influenced reading comprehension and recall for good students this did not mean that there would be automatic use of organized recall of the information read.

Taylor and Samuels (1983) found that a significant percentage of students are unaware of the text structure of expository passages. The authors also noticed that students do not use structure to understand and remember information from well structured texts. Similarly, Taylor and Beach (1984) taught middle school students about expository text structure, then taught them how to write summaries following the hierarchical organization of headings and subheadings in social studies text. The authors found the trained students were better at remembering the new materials than the untrained students.

Another study by Kintsch and Yarbrough (1982) further

confirmed the importance of structure in text processing. College students were used in the study and the investigators concluded that reorganizing textual cues may be helpful in controlling and guiding the overall processing of text.

In contrast to these studies, Horowitz & Rogers (1983) demonstrated that skilled college readers do not need to have a text pattern made explicit. They argue that students are able to infer an overall structure for a text when one is not present because students understand the functions of their specific fields and have stored for recall the schemata of patterns that can be used in these fields.

Therefore, instructional process of learning strategies should be geared as closely as possible to "natural" situations in college. Horowitz (1985b) reported that training students to detect cause-and-effect patterns from history texts, and training them in writing cause-effect essays significantly increased the use of cause-effect patterns and elaboration upon history ideas in subsequent writing. The study showed that students with training to read and mark cause-effect patterns only was not any more effective than routine reading instruction. The author concluded that instruction in knowledge of text patterns is insufficient and ineffective in enhancing the students' performance at freshmen level in college. Students can learn only if they can relate written language to meaning, and relate their personal experiences to academic experiences.

Brown, Smiley, and Lawton (1978) studied a large sample of 5th through 12th graders and a group of college students who read the same passages which were divided into four levels of importance to the whole text. The students were then asked either to select the most important idea units in the story of to select the units that would best help them to retrieve the rest of the story. The researchers found that the college students discriminated between what propositions are important and what propositions will be most helpful for retrieval. None of the groups of children and adolescents made this discrimination.

The findings of the research suggested that (a) subordination or hierarchical structure is a prominent feature of many texts; (b) there are clear age-related shifts in the ability to parse texts intuitively into clear hierarchial categories; and (c) the most superordinate information in a text is what is most important in it.

Summary

The review of the current literature indicates that the usage of a combination of different learning strategies are more effective than the use of any particular strategy to the exclusion of all others. Learning strategies must be built upon the students' awareness of certain skills and the ability to use self-regulatory techniques to ensure the successful completion of the given task. Awareness of learning strategies provide the basis for acquisition of

specific skills and expands the students' learning processes.

Moreover, the review of the literature indicates that students' academic success is enhanced through goal formation, planning, strategy deployment, and monitoring (Baker & Brown, 1981). Goal formation involves efforts made to formulate a clear goal, accomplishment, or purpose for which the reading and learning is undertaken. By planning, the researchers state that it concerns the adoption of general steps from among alternative ones available to be taken to fulfill the goals. Strategy deployment concerns the specific skills adopted to fulfill the plan.

Finally monitoring concerns the various steps taken to gauge the success of the whole enterprise. These findings serve to support the need for research in the areas of learning strategies. Learning strategies should be addressed throughout the educational process to better prepare students for academic success especially in college. With the amount of research for the improvement of learning strategies of college students there are still questions that need to be addressed due to the complexity of the process of learning from text.

This chapter presented the theoretical foundation for this proposed study and serves as the review of literature. The major issues are covered and related literature is reviewed. The growing body of studies pertaining to the types of learning strategies of students, their metacognitive knowledge of the strategies, and how these strategies relate

to the learning process in general, and their use of various types of texts were examined. Students should know how, when, where, and why they need to be strategic in their learning so that they can achieve academic success. Since metacognitive theory views the reading process as holistic, consisting both the knowledge phase and the strategy phase, college students will achieve success through constant monitoring and regulation of appropriate strategies when comprehension fails. While there has been extensive research done on the effects of learning strategies of students using expository texts, the effects of learning strategies of college freshmen using both narrative and expository texts have not been extensively studied.

Chapter III presents an overview of a split-plot design of this study with respect to the subjects, instruments administered to the subjects to gather the data, and a description of the analysis of the data.

CHAPTER III

METHOD AND PROCEDURE

Introduction

The purpose of this study is to investigate the relationship between different learning strategies and reading comprehension of college freshmen. This chapter describes the sample used, the instruments, the methods and procedures, and the research design utilized for the data collection. Finally a description of the analysis of the data using multiple regression (Mendenhall, & McClave, 1981) is provided to conclude the chapter.

Selection of Subject

For the purpose of this study data were collected from one hundred and twenty-four second semester college freshmen enrolled in Freshmen Composition and Reading and Study Skills classes for spring 1988-1989 school year from a comprehensive midwestern university. The participants for the study were both male and female students, whose chronological age ranges from 18 to 36 years. The subjects remained as intact groups, and to control for the initial differences in reading ability among the groups, the total score from the Nelson-Denny

Reading Test were used as a covariate. The subjects (mean age = 20.29 years) were all volunteers and to be included in this study they must have completed the Nelson-Denny, the comprehension responses for both the narrative and the expository texts, the forced-choice Learning Strategy Inventory, and the demographic survey sheet.

Instruments

Nelson-Denny Reading Test Form-E (NDRT-E)

The Nelson-Denny Reading Test (Brown, Nelson, and Denny, 1973; Brown, Bennett, and Hanna, 1981), selected for the research was designed to measure students' skills in vocabulary development, reading comprehension, and reading rate. This test consists of two subtests: a 100-item multiple-choice vocabulary test which measures students' knowledge of words and word meanings, and a reading comprehension subtest containing eight reading passages with a total of thirty-six questions. Half of the thirty-six items are interpretative, and the remaining are literal in nature (p 10). The contents of the passages involve English literature, social studies, and natural sciences. According to the Buros Mental Measurement Year Book, Forms C and D (1973), Forms E and F (1981) are used most frequently, and they do not differ in terms of overall content or scoring. The administration time, including answer sheet preparation should not exceed 45 minutes: 15 minutes for the 100-item vocabulary section, and 20 minutes for the reading

comprehension section, with the first minute of the reading comprehension section designed to determine each student's reading rate in words per minute. The Nelson-Denny Reading Test (NDRT) is the most used test of reading comprehension at the college level in the United States (Gordon and Flippo, 1983). The authors of the test (Brown, et.al., 1976, p. 3, & p. 14) suggest that the Nelson-Denny Reading Test is useful for predicting academic success. Forms E and F were normed from a population of students ranging from 9th grade through seniors in college. The Examiner's Manuals for Forms E of the Nelson-Denny Test (1973; 1981) provide reliability of .91, .74, and .66 for the vocabulary, comprehension, and reading subtests respectively. The Nelson-Denny Reading Test Form E (NDRT-E) was administered to all participants in this study. The main purpose in using this instrument is to use the total score as the covariate to control for the initial differences of the reading ability of the subjects. According to Brown et al (1981), the goal of the test is to provide a trustworthy ranking of American college students' ability in three areas of academic achievement: reading comprehension, vocabulary development, and reading rate.

Reading Comprehension Passages

To assure the validity of the text materials, the researcher and a panel of experts selected passages from introductory text books in various courses. Because college

freshmen were reading text books by current publishers, the selections for both the narrative and the expository texts were chosen from text books published fifteen years ago. One narrative and one expository selection were chosen from an original pool of three narrative and three expository selections.

The narrative text which has 2017 words, entitled "The Land of Houyhnhnms" (Jonathan Swift, 1976) was chosen as one of the reading passages. This is a selection from the well known classic Gulliver's Travels. The expository passage, entitled "Basics of the Nervous System" (2032 words) is from Psychology: An Introduction, authored by Kagan, J. & Havemann, E. (1976). These texts met all of the following five criterias: 1) Fry's readability Formula and Graph rated the selections as being at the 12 + level; 2) the selections should be similar in terms of topic to minimize content bias against either groups of the subjects' strategy use (Afflerbach and Johnston, 1984), and the narrative passage was of clear language, had well developed plots and clear story structures as defined by Stein and Glenn (1979); the expository text was written in a clear informational style and was judged to be "considerate" according to criteria identified by Anderson and Armbruster (1984); 3) the passages were of sufficient length to enable the development of questions; 4) the passages were of extended length favorable to the understanding of concepts, clear textual headings, illustrations: and 5) the passages were of equal difficulty

and interest for most college freshmen.

To examine the appropriateness of using these texts in the study, the researcher used five of her fellow doctoral colleagues teaching reading courses to form a panel of experts. The panel members were briefed on the criteria to be followed. The panel members were also given three selections of narrative and three selections of expository texts. They rated their respective selections' difficulty levels for undergraduate freshmen students from different academic areas.

The readability graph developed by Edward Fry (1968, 1977) was used to calculate the readability of the selections provided to the panel. The graph was designed to identify the grade-level score for materials from first grade through college. The variables used to predict the difficulty of the reading material; sentence length and word length. Sentence length was determined by the total number of sentences in three sample passages. Word length was determined by the total number of syllables in the above sample passages. Fry recommended that three 100-word samples from the reading materials be used to calculate its readability. The first sample passage was chosen from the beginning of the book, the second from the middle of the book, and the third towards the end of the book. According to Fry, the readability graph predicts the difficulty level of the material within one grade level. The graph and expanded directions for the Fry formula are presented in **Appendix A.** After much discussion,

the panel approved using the Gulliver's Travels selection and the Basic Nervous System selection for this study.

A five-item comprehension questionnaire for each of the two selections was designed by the researcher with the aid of the panel members. Questions were focused on tapping subjects' literal, inferential and evaluative understanding of the major concepts presented in the selection. The inter-raters' agreement was 95%.

Learning Strategy Inventory

All subjects were administered a 16-item forced-choice Learning Strategy Inventory **(refer Appendix B)** to facilitate the classification of strategies as reported by Alexander (1986). The Inventory measures the categories of learning strategy as classified by Farr and Mitchell (1981) and later modified by Alexander (1986). This inventory was chosen because it categorized commonly mentioned strategies into specific groups.

According to Farr and Mitchell (1981) the three categories of learning strategy are: a) text-related strategy which include circling, underlining or rereading that demonstrate no deviation from or modification of the existing text, (eg. read and reread the chapter at least one additional time); b) mixed-strategy which include paraphrasing, summarizing, logical thinking, drawing conclusions, and sequencing that involves some elaboration of the text, (eg. took notes while you read the chapter); and

c) schema-related strategy include prediction, question formulation, generating analogies (relating text information to prior knowledge/experiences, making judgements in regard to text content) and imagery (adding information and indication awareness of new learning) that are the least dependent on the text (eg. asked yourself questions about the ideas presented in the chapter prior to, during, and/or after reading).

According to Farr and Mitchell (1981), text-related strategy also referred to how learners handled the text. Text-related strategy reflect the subjects' attempt to comprehend the explicit (surface) message of the text. The mixed strategy is reflected in the learners' comprehension of both explicit and implicit (inferential) message of the text. Finally, the schema-related strategy represented the learners' attempt to integrate, evaluate, and relate prior knowledge/ experiences to the text message.

The subjects responded to a 5 point-Likert perception scale with assigned quantitative values from 1 to 5 with 1=never to 5=always. The subjects indicated their learning strategies for comprehending the content of the selections. The text-related strategy category comprised of seven items. The responses on items 1-7 yielded a mean score for the text-related strategy. The mixed strategy category had six items and the responses on items 8-13 yielded a mean score for mixed strategies. The schema-related strategy category had three items and responses on items 14-16 yielded a mean score

for schema-related strategies. This inventory was also developed based on information gleaned from an inventory developed by Schallert and Tierney (1980).

Procedure

In this study four sets of data were collected by the researcher: the Nelson-Denny Reading Test (NDRT-E), answers to the narrative and expository texts, a 16-item forced-choice Learning Strategy Inventory, and a demographic data sheet. At the onset of data collection, the researcher first visited with the Director of Freshmen Composition and then with the Coordinator of the Reading and Study Skills Laboratory at a mid-western comprehensive university to schedule two separate meetings with section instructors who taught freshmen composition/reading and study skills classes for the spring semester of 1988-89 school year. Data were collected from all the male and female students in these classes, as a regular classroom activity, but to be included in this study the participants (n=124) must be true second semester freshmen.

At the two separate meetings with the class instructors, the researcher scheduled the dates and times (regular class period) with the respective instructors to administer the first of the four instruments; the timed in-class Nelson-Denny Reading Test (NDRT-E). To ensure uniformity in administering the NDRT-E by the instructors, the researcher also provided training on how to administer the instrument,

and emphasized the importance of reading fully the written instructions (refer Appendix C) to the class prior to administering the test.

Following the in-class NDRT-E test, each class instructor administered to their respective classes the demographic survey form, the 16-item forced choice Learning Strategy Inventory (Appendix B), and the first set of the two untimed take home comprehension tests. To minimize narrative-to-expository order variability or vice-versa, one half of the subjects was randomly assigned the narrative passage (Appendix D) and the remaining half the expository passage (Appendix E). The subjects were instructed to study "as they usually would" the comprehension passages, and to respond to the questions that followed. The subjects were also asked to respond to the forced choice Learning Strategy Inventory and the demographic survey sheet after they have finished answering the comprehension questions.

After the subjects had returned the completed Learning Strategy Inventory, the demographic survey form, and the answer sheets to the comprehension tests, the different class instructors administered the second set of the untimed take home comprehension passages. Those subjects who were administered the narrative passage were given the expository passage, and those who responded to the expository were given the narrative. Only the participants with completed data for the demographic survey form, the Learning Strategy Inventory, and the first set of the comprehension test were

administered the second set of the comprehension test.

Scoring

There were 5 questions for each passage. For the narrative passage (**Appendix D**), two points each were awarded for questions 1 and 2, four points each for questions 3 and 4, and eight points for question 5. Similarly, for the expository passage (**Appendix E**), two points each were awarded for questions 1 and 2, four points each for Question 3 and 5, and eight points for question 4. Incorrect answers were given no (0) points. Thus the possible total score on the short answer comprehension tests ranged from 0 to 20 points for each text. Three raters independently scored the responses to the two texts. There were a few discrepancies, and these were resolved by the researcher.

Self-scoring answer sheets were used for the NDRT-E. Each answer sheet has the correct answers on the carbon copy. The correct answers were counted according to the items. The vocabulary subtest has 100 possible points. The reading comprehension subtest has 72 possible points. The total scores of both the vocabulary and comprehension sections were used in this study.

Following the data collection from the students enrolled in Freshmen Composition and Reading and Study Skills classes, the subjects' responses to the learning strategy inventory were tallied and grouped into three categories of learning strategy. The categories are: a) text-related strategy which

include circling, underlining, or rereading that demonstrate no deviation from or modification of the existing text; b) mixed strategy which involved paraphrasing, summarizing and sequencing that involve some elaboration of the text; c) schema-related strategy which include prediction, question formulation, generating analogies, and imagery that are the least dependent on the text.

Research Design

For the purpose of this research, regression analysis for repeated measures was used to test for significant relationships between learning strategy and reading comprehension. Reading ability was used as a covariate to control for initial differences between the groups. The two between-subject variable are learning strategy (schema, text, mixed) and gender (male, female), and the within-subject or repeated measure variable is text-type (narrative, expository).

Testing of Hypotheses

The following null hypotheses were tested:

1. There are no statistically significant differences among the three categories of learning strategy (schema-related, text-related, and mixed).

2. There is no statistically significant difference between male and female subjects in reading comprehension.

3. There is no statistically significant difference

between the text narrative and expository texts.

4. There is no statistically significant interaction between the learning strategy factor and the gender factor.

5. There is no statistically significant interaction between the learning strategy and types of text.

6. There is no statistically significant interaction between the gender factor and the types of text factor.

7. There are no statistically significant interaction among the learning strategy, gender, and types of text.

Statistical analysis of all data was carried out on an IBM micro-computer using the System for Statistics (SYSTAT) package. Since the Analysis of Variance formulas are specific to experimental design and require equal number of subjects in each cell, regression analysis is more appropriate for correlational studies especially when the independent variables are uncontrolled (Mendenhall, & McClave, 1981). This involves three main effect tests (learning strategy, text-type, and gender), a covariate test (reading ability), three two-way interaction and one three-way interaction test. To control the overall Type one error rate, each significance test was conducted at the .01 level. A sample size of 124 subjects was used to ensure 80% power (Cohen, J. & Cohen, P. 1983).

Summary

Chapter III presented an overview of the research design with respect to the subjects involved in the investigation.

the instruments used for data collection, the research design and the analysis of the data. Chapter IV presents the result of the research.

CHAPTER IV

ANALYSIS OF THE DATA

Introduction

The purpose of this study was to investigate the relationship between the three categories of learning strategy (text-related, schema-related, mixed) and the reading comprehension of college freshmen using both narrative and expository texts. The learning strategies used by the subjects were identified through the forced-choice Learning Strategy Inventory. The subjects were then grouped into three categories of strategy according to the students' summative scores of the items on the Learning Strategy Inventory. The comprehension scores from both the narrative and the expository texts were used as the dependent variable.

The researcher compared the categories of learning strategy used by the college freshmen in terms of their comprehension scores. This study involved 1) administering the reading passages -- both expository and narrative, 2) administering the forced-choice Learning Strategy Inventory and grouping of subjects into three categories of learning strategy, 3) administering the Nelson-Denny Reading Test (Form-E), and collecting the demographic data.

In this study there are three factors; learning strategies (schema-related, text-related, and mixed strategies), gender (females and males), and types of text (expository and narrative); with repeated measures across both levels of the last variable. This means that all subjects responded to both narrative and expository texts. Thus, the study has two between-subject variables and one within-subjects variable. This chapter presents the data gathered from a sample of one hundred and twenty-four second semester college freshmen at a mid-western comprehensive university. The subjects had an average age of 20.26 years with a range of 18 to 36 years. The results indicated graphically in **Figure 1** the age of

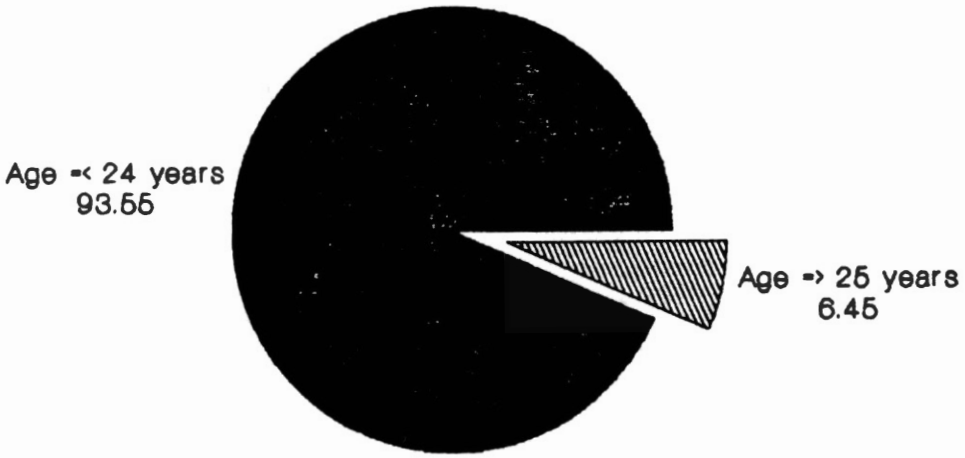

Figure 1. Traditional & Nontraditional Students By Percentage

subjects by percentage. From a total of 124 only 6.45 percent were above twenty-four years of age and 93.55 percent were between eighteen and twenty-four years old. Figure 2

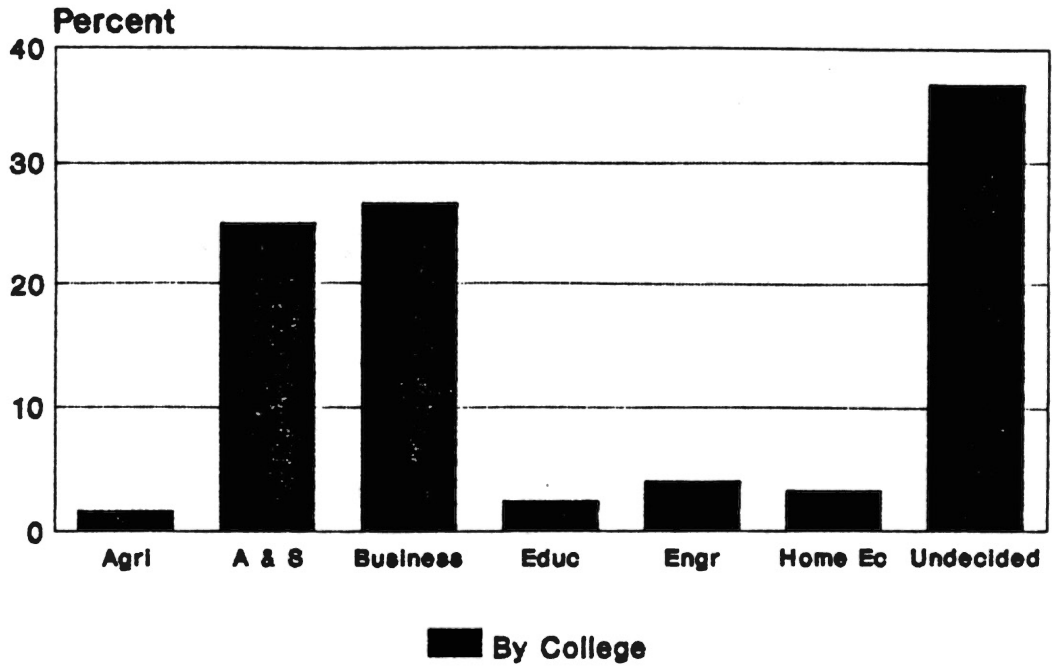

Figure 2. Participants By College

shows the distribution of the subjects according to the colleges they plan to major in. The distribution reveals 1.61 % from the college of agriculture, 25.00 % from Arts and Sciences, 26.61 % from Business, 2.42 % from education, 4.03 % from Engineering, 3.23 % from Home Economics and 37.10 % were undecided.

Figure 3 and Figure 4 (refer next page) shows the reported number of hours the subjects studied and worked per

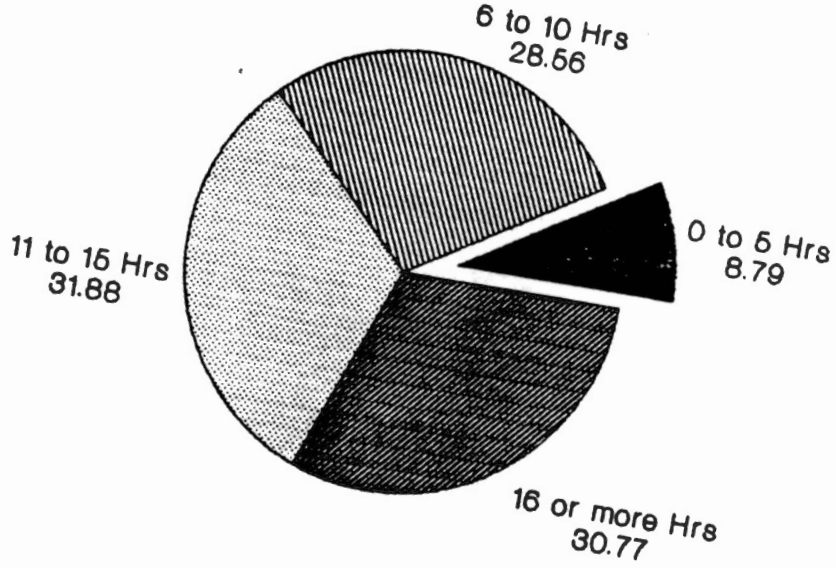

Figure 3. Hours Studied Per Week By Percentages

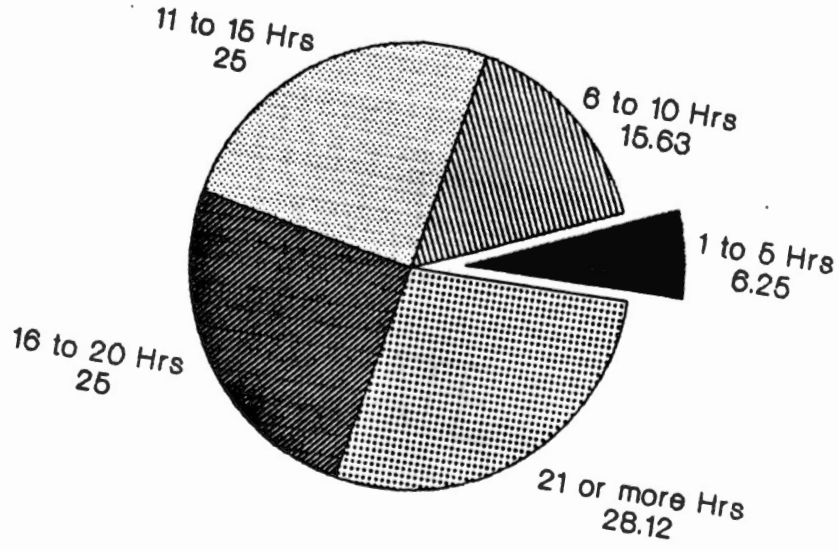

Figure 4. Number of Hours Worked Per Week By Percentage

week by percentages respectively. More than half the subjects (62.65%) reported they studied for eleven or more hours per week, with 30.77% of them putting in sixteen or more hours. 8.79% reported they studied for six or less hours. Among the subjects who worked per week, 28.12% worked for twenty-one or more hours, 25.0% for sixteen to twenty hours, 25.0% for eleven to fifteen hours, 15.63% for six to ten hours, and 6.25% for five or less hours.

Analysis of Data According to Hypotheses

Regression analysis for repeated measures using the System for Statistics for the PC (SYSTAT) package was utilized to analyze the data. The two between-subject variables are learning strategy (schema; text-related; mixed) and gender (male; female), and the within-subject or repeated measures variable is text-type (narrative; expository). Reading ability was used as a covariate to control for initial differences between the groups, and to control for type I error, each of the following seven hypotheses were tested at the 0.01 significant level.

Hypothesis 1

It was hypothesized that there would be no significant differences among the three categories of learning strategy: schema-related, text-related and mixed. The means and the

standard deviations for the three categories of learning strategy are reported in **Table I.** The mean comprehension scores (both narrative and expository) for the schema-related group (n=52) was 14.298, text-related group (n=36) was 13.528, and the mixed group (n=36) was 14.014.

TABLE I

MEAN AND STANDARD DEVIATION OF COMPREHENSION SCORES FOR LEARNING STRATEGY

	Schema	Text	Mixed
Mean	14.298	13.528	14.014
SD	2.973	3.094	2.380
	n=52	n=36	n=36

An examination of the analyses revealed no statistically significant differences among the means for the three categories of learning strategy. This means that the subjects performed equally well on comprehension scores associated with each learning strategy when combined for females and males, and then averaged across both the narrative and expository texts. Therefore, hypothesis 1 was not rejected and it was concluded that there was no statistically significant differences among the three

categories of learning strategy.

Hypothesis 2

It was hypothesized that there would be no significant differences between male and female in reading comprehension scores. This means that male subjects performed the same as female subjects on reading comprehension when all the scores associated with the three categories of learning strategy were combined and then averaged across the narrative and expository comprehension scores. The means and standard deviations for the gender variable can be found in **Table II**

TABLE II

MEAN AND STANDARD DEVIATION OF TOTAL COMPREHENSION SCORES FOR GENDER

	Female	Male
Mean	14.326	13.573
SD	2.506	3.198
	n=69	n=55

For female subjects (n=69), the mean comprehension score was 14.326, and the standard deviation was 2.506. For male subjects (n=55) the mean score was 13.573, with a standard

deviation of 3.198. Results of the analyses showed that there was no significant difference between male and female subjects. Therefore, the null hypothesis was not rejected.

Hypothesis 3

It was hypothesized that there would be no statistically significant difference between the narrative and expository texts. Since text type is the repeated measure for this study, there were one hundred and twenty-four subjects for each type of text (refer Table III). The mean for the

TABLE III

MEAN AND STANDARD DEVIATION OF EXPOSITORY/NARRATIVE SCORES

	Narrative	Expository
Mean	13.855	14.121
SD	3.680	3.589
	n=124	n=124

narrative passage was 13.855, with a standard deviation of 3.680. The mean for the expository passage was 14.129, with a standard deviation of 3.589. This hypothesis deals with the question of main effect for the repeated measures

(within-subjects) factor. Analysis of the data indicated there was no significant difference between the means for the narrative text and the expository text. This means that all one hundred and twenty-four subjects performed equally well on both passages. Therefore, the null hypothesis 3 was not rejected.

Hypothesis 4

It was hypothesized that there would be no significant interaction between the learning strategy factor and the gender factor. This hypothesis deals with the question: Does the increase or decrease in mean comprehension performance for males and females vary according to the categories of learning strategy used? **Table IV** shows the means and

TABLE IV

MEAN AND STANDARD DEVIATION OF TOTAL COMPREHENSION SCORES FOR LEARNING STRATEGY BY GENDER

		Schema	Text	Mixed
Female	Mean	14.817	14.132	13.775
	SD	2.514	3.113	1.705
		n=30	n=19	n=20
Male	Mean	13.591	12.853	14.313
	SD	3.439	3.020	3.060
		n=22	n=17	n=16

standard deviations for female and male subjects with respect to the three categories of learning strategy. Figure 5 presents the mean comprehension scores obtained by female

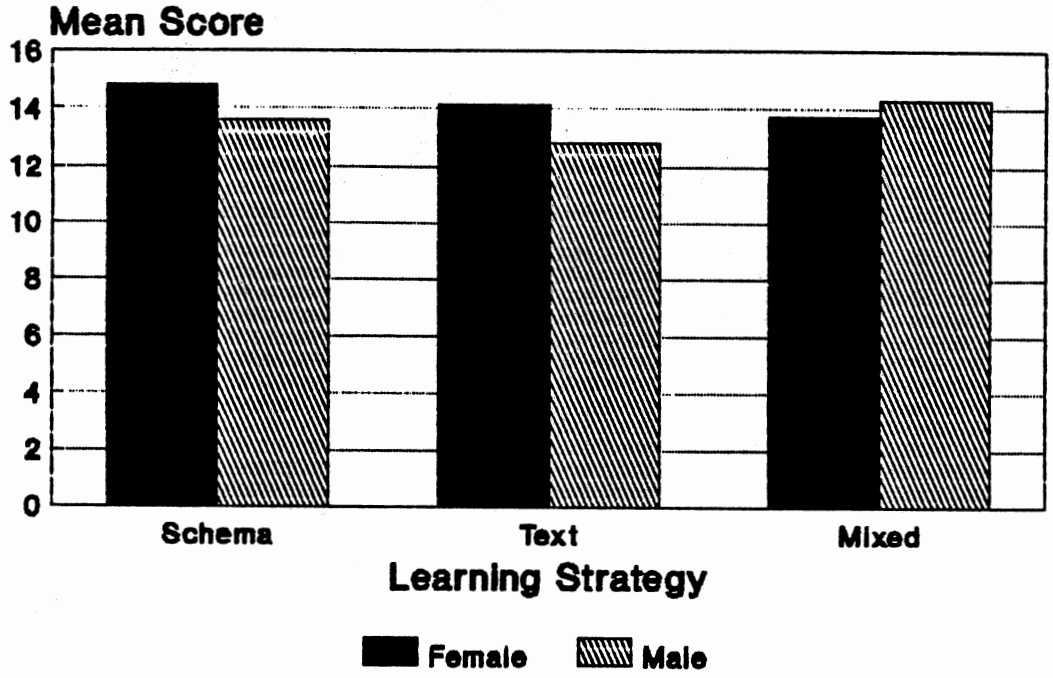

Figure 5. Learning Strategy By Gender

and male subjects in each category of learning strategy. The female subjects scored higher than male subjects for both schema and text strategies, but male subjects scored higher than female subjects for the mixed strategy. Even though female subjects scored higher for both the schema and text strategies, the differences between these two strategies were similar, but for the mixed strategy, male subjects performed

better than females and there was a smaller mean difference. However, the statistical analysis of the data suggested that there was no significant interaction between the three categories of learning strategy and gender. Hence, the results suggested that the increase or decrease in mean comprehension performance for male subjects and female subjects vary independently of learning strategy involved. Therefore, the null hypothesis 4 was not rejected.

Hypothesis 5

It was hypothesized that there would be no statistically significant interaction between learning strategy and text type. **Table** V presents the means and standard deviations for

TABLE V

MEAN AND STANDARD DEVIATION OF TOTAL COMPREHENSION SCORES FOR LEARNING STRATEGY BY TEXT TYPE

		Schema	Text	Mixed
Narrative	Mean	14.327	12.889	14.139
	SD	3.639	4.104	3.173
		n=52	n=36	n=36
Expository	Mean	14.269	14.167	13.889
	SD	4.150	3.410	2.906
		n=52	n=36	n=36

the narrative and expository texts with respect to the three categories of learning strategy. Figure 6 presents the graph

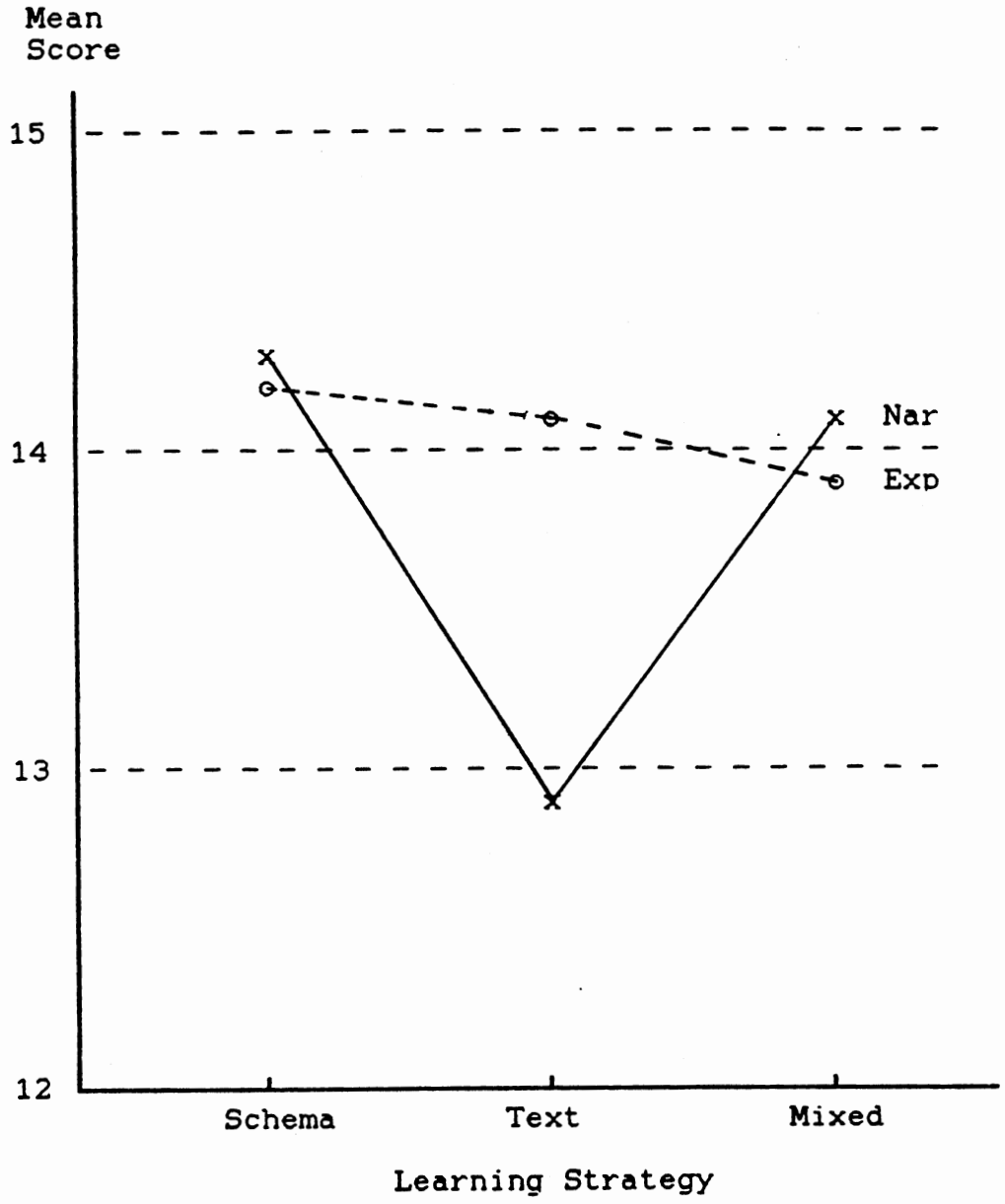

Figure 6. Learning Strategy By Text Type Interaction

of the two factors: learning strategy by types of text. The mean comprehension scores for all subjects using the three categories of learning strategy and two types of text were plotted. Subjects who used the text-related strategy had higher comprehension scores for the expository text than for the narrative text, but those who used the schema-related and mixed strategies scored better in the narrative text. However, there was a wider difference in the scores for those who used the text-related strategy than those who used the other two categories of learning strategy.

To control for narrative-to-expository variability and vice-versa, the subjects (n=124) were randomly assigned the order in taking the two types of texts. Half the subjects were administered the narrative text and half the expository text at the first of the two untimed take home tests. The order was reversed for the second take home test. A simple t-test showed that there was no significant order effects. However, regression analysis for the three categories of learning strategy by type of text used indicated a statistically significant interaction ($F = 4.821$, $df = 2/117$, $p < 0.01$), suggesting that the degree to which the subjects' comprehension scores differ for the narrative and expository texts is dependent upon the category of learning strategy utilized. Therefore, the null hypothesis 5 was rejected.

Hypothesis 6

It was hypothesized that there would be no significant

interaction between the gender factor and the text type factor. This hypothesis deals with the question: Do female and male subjects have a similar pattern of reading comprehension for both narrative and expository texts. The means and standard deviations for both the narrative and expository texts with respect to males and females are shown in **Tables VI.** For the narrative text, the mean for the

TABLE VI

MEAN AND STANDARD DEVIATION OF EXPOSITORY/NARRATIVE SCORES BY GENDER

		Female	Male
Narrative	Mean	14.348	13.236
	SD	3.316	4.037
		n=69	n=55
Expository	Mean	14.304	13.909
	SD	3.603	3.592
		n=69	n=55

female subjects was 14.348 while the mean for the males was 13.236. For the expository text, the means for females and males were 14.304 and 13.909 respectively. **Figure 7** (refer next page) presents a bar chart for the comprehension scores

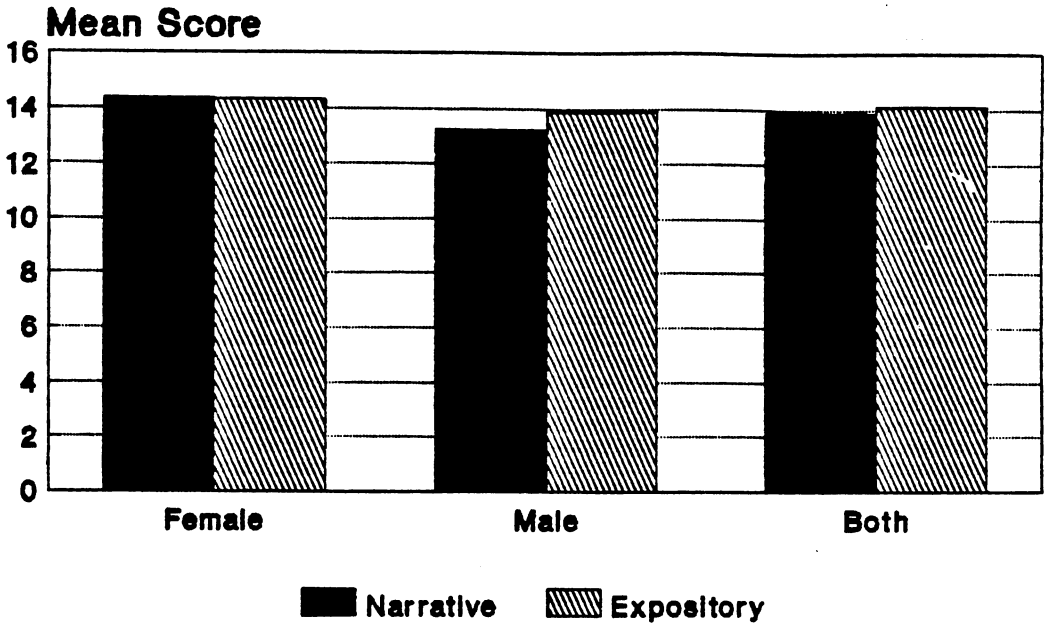

Figure 7. Gender By Text Type Interaction

for both male and female subjects using both the narrative and expository texts. The female subjects scored higher than male subjects for the narrative text, but for the expository text the male subjects scored higher than the females. However, results of the data analysis indicated no significant interaction between expository and narrative texts for male and female subjects. Therefore, the null hypothesis 6 was not rejected.

Hypothesis 7

It was hypothesized that there would be no statistically significant interaction among learning strategy, gender and types of text. This deals with the question: Is the trend

of reading comprehension scores across the narrative and expository passages the same for both male and female subjects with respect to the three categories of learning strategy. The means and standard deviations for the narrative and the expository texts (Learning Strategy By Gender) are presented in **Table VII.**

TABLE VII

MEAN AND STANDARD DEVIATION OF
EXPOSITORY/NARRATIVE SCORES
FOR LEARNING STRATEGY
BY GENDER

		Schema	Text	Mixed
Expository				
Female	Mean	14.93	14.74	12.95
	SD	4.24	3.19	2.56
		n=30	n=19	n=20
Male	Mean	13.36	13.53	15.06
	SD	3.94	3.63	2.96
		n=22	n=17	n=16
Narrative				
Female	Mean	14.70	13.53	14.60
	SD	3.26	4.20	2.35
		n=30	n=19	n=20
Male	Mean	13.82	12.18	13.56
	SD	4.13	4.00	3.98
		n=22	n=17	n=16

Figures 8A and 8B present the graphs for the expository

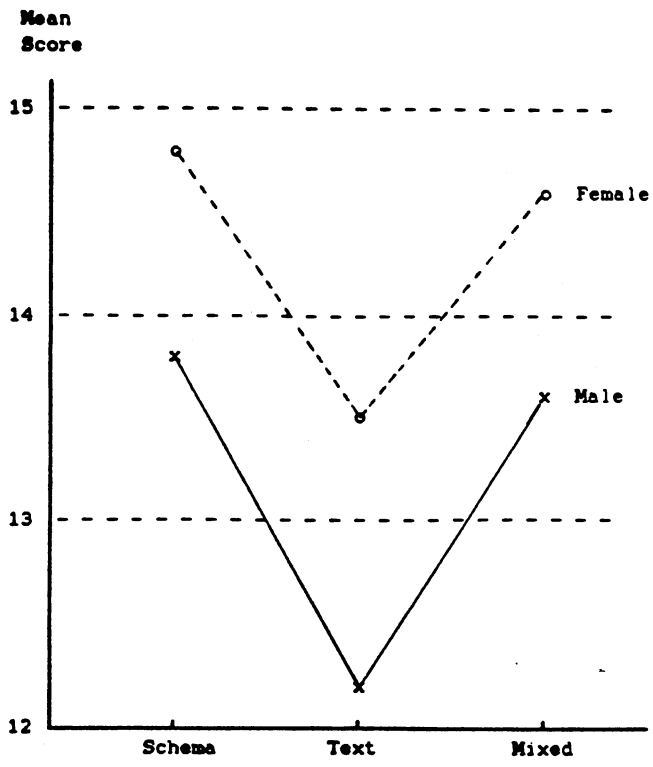

Fig. 8A Narrative Text

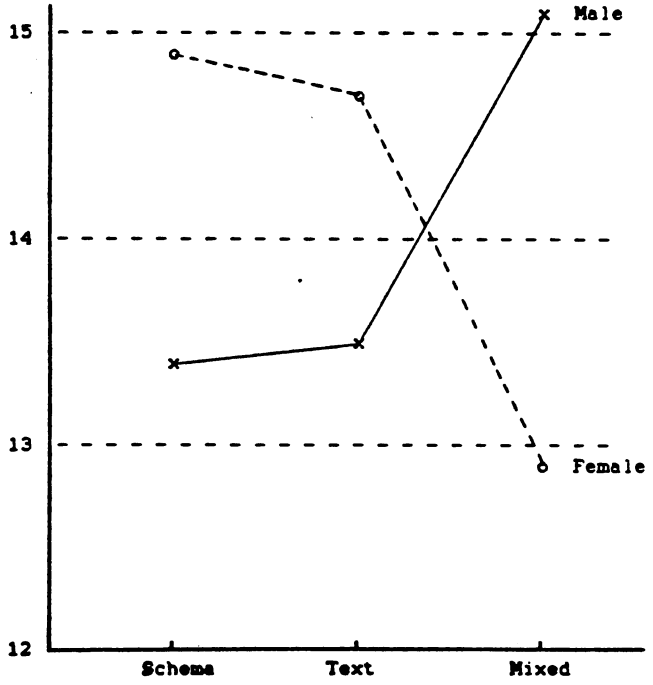

Fig. 8B Expository Text

Figure 8. Learning Strategy By Gender By Text Type Interaction

and the narrative texts (learning strategy by gender). The trend of reading comprehension scores across the expository text (**Figure 8B**) for female subjects was higher than male subjects for the schema-related and text-related strategies. However, for the subjects who used the mixed strategy, males registered higher mean scores then females, and there was a wider mean difference between the gender, relative to the schema-related and text-related learning strategy.

The graph for the narrative text (**Figure 8A**) shows that the subjects responded differently from those for the expository text (**Figure 8B**). Females scored higher than males and the mean differences were similar for all three categories of learning strategy. Further regression analysis by repeated measures indicated that there was a three-way statistically significant learning strategy by gender by types of texts interaction ($F=4.980$, $df = 2/117$, $p < 0.01$), which indicated that the trend of reading comprehension scores across the narrative and expository texts was not the same for male and female subjects, and was dependent upon the categories of learning strategy used by the subjects. The non-parallel lines for the expository text (**Figure 8B**) and the different patterns for both the narrative and expository graphs (**Figures 8A & 8B**) further confirmed this significant interaction. Therefore, the null hypothesis 7 was rejected.

Summary

This chapter presented the results of the study. The

regression analysis for repeated measures was used to test for significant relationships between learning strategy and reading comprehension. Out of seven hypotheses tested, one two-way interaction and one three-way interaction were found to be statistically significant. The remaining three main effects and two-way interactions were not significant.

The three-way Learning Strategy X Text Type X Gender significant interaction indicated that the differential reading comprehension performance of the subjects in this study was dependent upon the learning strategy employed, the type of text utilized, and whether the subjects were males or females. The results also indicated one significant two-way interaction between learning strategy and types of texts.

For the narrative text; females performed better than males, but the difference in mean comprehension scores between males and females were similar across all three categories of learning strategy. However, subjects who reported using the schema-related strategy registered superior scores than those who reported using the text-related and the mixed strategies.

For the expository text; females who used the schema-related and the text-related strategies obtained higher scores than males, but males did better than females for the mixed strategy. However, the mean comprehension scores between males and females vary from one learning strategy to another, with the largest difference for the mixed strategy, and the smallest difference for the text-related strategy.

CHAPTER V

DISCUSSION AND RECOMMENDATIONS

Introduction

The purpose of this study was to investigate the relationship between three categories of learning strategy and reading comprehension of second semester college freshmen using both expository and narrative texts. Sixty-nine female and fifty-five male subjects (n=124), enrolled in freshmen composition and college reading and study skills classes in a mid-western comprehensive university, served as subjects for this investigation. The subjects' ages ranged from 18 years to 36 years (mean=20.3 years), with 93.6 % of the participants under the age of 24 years. Of the 124 subjects, 26.6 % were from the College of Business, 25.0 % from Arts and Sciences, 4.0 % from Engineering, 3.3 % from Home Economics, 2.4 % from Education, 1.6 % from Agriculture, and 37.1 % undecided on their major.

All the participants in the study were volunteers, and to be included in the study, they must have completed data on the Learning Strategy Inventory, demographic sheet, NDRT-E, and responses to both the expository and narrative comprehension questions. To control for possible "order

effects", half the subjects were randomly assigned the narrative text and half the expository text at the first of the two take home comprehension tests. The order was reversed when the subjects were administered the second test. For the purpose of this study, the classes remained as intact groups, and to control for initial differences in reading ability between the groups, the total score from the NDRT-E was used as a covariate in the data analysis.

Findings

The major findings in this investigation were:

1. Overall, the differential comprehension performance of the subjects in this study was dependent upon the categories of learning strategy employed by the subjects, the type of text, and whether the subjects were males or females. Generally, subjects who used the schema-related strategy registered superior scores than those who used the text-related and the mixed strategies, and females had higher scores than males.

2. When comparing the comprehension scores between the narrative and expository texts, there were negligible differences for subjects who reported using the schema-related and the mixed learning strategies, but there was relatively a larger difference between the mean scores for those who used the text-related strategy. Additionally, those who used the schema-related strategy obtained higher scores than those who used the text-related and the mixed

strategies for both types of text.

3. For the narrative text; females performed better than males, subjects using schema-related strategy did better than the text-related and the mixed strategy, and the differences in mean comprehension scores between males and females were similar across all three categories of learning strategy.

4. For the expository text; females scored higher than males for the schema-related and text-related strategies, but male subjects who used the mixed strategy performed better than females. However, the mean comprehension scores between males and females vary from one learning strategy to another, with the largest difference for the mixed strategy, and the smallest difference for the text-related strategy.

Discussion and Implications

This study examined the relationship between reading comprehension and three categories of learning strategy using both narrative and expository texts. Results of this investigation revealed that reading comprehension is an interactive process (between the reader and the text, and with the learner's own learning strategies) and that learning strategies were not independent of types of text and gender. Such findings were in agreement with some previous studies. Brown (1985) pointed out that both good and poor learners used basically the same learning strategies, but most good learners do adjust their learning strategy in response to

types of texts. Garner and Kraus (1981-1982) also found that some learners do not have sufficient knowledge about learning strategies or how to use them efficiently. They stated that increased awareness of learning strategies highly correlated with students' comprehension performance, and suggested that the knowledge of learning strategies by itself do not distinguish efficient learners from inefficient ones. According to current views about metacognition (eg. Baker and Brown, 1984), there are numerous ways and manners of using different learning strategies, and as the students grow older their control and regulation of their learning strategies would improve. The authors suggested that if students are made more aware about themselves as learners, their tasks, the types of text, and their repertoire of learning strategies, they will be more active and effective in the learning process.

More importantly, results form this study suggested evidence that subjects who employed the schema-related learning strategy consistently performed better than those who used the text-related and the mixed strategies. Bartlett (1932) referred to schema as "an active organization of past reactions or past experience" (p.201), and according to Anderson (1977), the schema theory proposed that when reading text, readers use their prior knowledge and the context of the situation to interpret and recall new information. Hence, when those subjects who used the schema-related strategy, used their background experiences and life

situations to process text materials, they comprehended the texts better than those who did not.

Several explanations could account for the superiority of the schema-related strategy. First, the schema-related strategy include skills such as prediction, generating analogies, imaging, summarizing and outlining which are related to the mental ability such as prior and personal experiences. All these in turn provide the subjects with the definite purpose in mind to focus on the information in the texts. Although the mixed and text-related strategies seem appropriate for comprehension, it could be that the schema-related strategy which required the interactive processes facilitated the comprehension of the two types of texts.

A second explanation for the higher scores when using schema-related strategy comes from the research on direct instruction of learning strategies (Day, 1980; Raphael & Mckinney, 1983; Simpson, 1983). Even though this body of research does not explicitly address the use of schema-related strategy, it does suggest that direct instruction on the strategy result in improved comprehension and recall (Duffy et al, 1987).

Further analysis of the data revealed that the learning strategies used by the subjects are dependent upon the type of texts. There was no difference in comprehension scores on both texts for those subjects who used the schema-related and mixed strategies, but there is a relatively larger mean difference between the two texts for the subjects who used

the text-related strategy. This relatively larger difference between the two texts for subjects using the text-related strategy may suggest that the type of text to be used for teaching reading comprehension is not critical for students using schema-related and mixed strategies, but it would be important for those who use the text-related strategy. The implication from this significant finding is that classroom teachers need to be aware of the different learning strategies employed by their students, so that the most appropriate teaching materials and methods may be utilized to best meet the individual needs of the students.

Recommendations

Results in this study have indicated that performance in reading comprehension for traditional college freshmen (18-24 years) using narrative and expository texts is dependent upon the learning strategy employed, and whether they are males or females. Subjects who reported using schema-related strategy scored higher than those who used text-related and mixed startegies, and females had higher scores than males.

Research suggested that all students can apply learning strategies, but there are some who are not aware of when and how to use them (Baker & Brown, 1985). Simpson (1986) stated that students need to be taught more "effective learning strategies". For example, optimal strategic learning (metacognitive strategies) results in the acquisition of such traits as confidence in student's ability to make choices,

recalling prior experiences/knowledge, and the ability to select from a reportiore of learning strategies. These characteristics of both metacognitive theory and schema theory enhance the student's perception of personal control and regulation of learning strategies, which have been linked to better academic success. Therefore, additional research that go beyond the confines of this correlational design on effective learning strategies is needed.

With increasing nontraditional students (over 24 years) among incoming college freshmen, it would be problematic to generalize the result of this study to such a population. Hence, it would be appropriate to conduct a similar study to investigate whether the results of the present study can be generalized to these nontraditional students.

Finally, in the present study the items in the forced-choice Learning Strategy Inventory were clustered together with the first seven items measuring text-related learning strategy, the next six items measuring mixed learning strategy, and the last three items measuring schema learning strategy. To avoid subjects from responding in a "set pattern" on the Likert scale, it is suggested that the items be randomly ordered in future studies using the inventory. Furthermore, the researcher has found that the three items measuring schema-related learning strategy are not completely satisfactory. Studies using a larger number of items for the schema-related learning strategy are in place.

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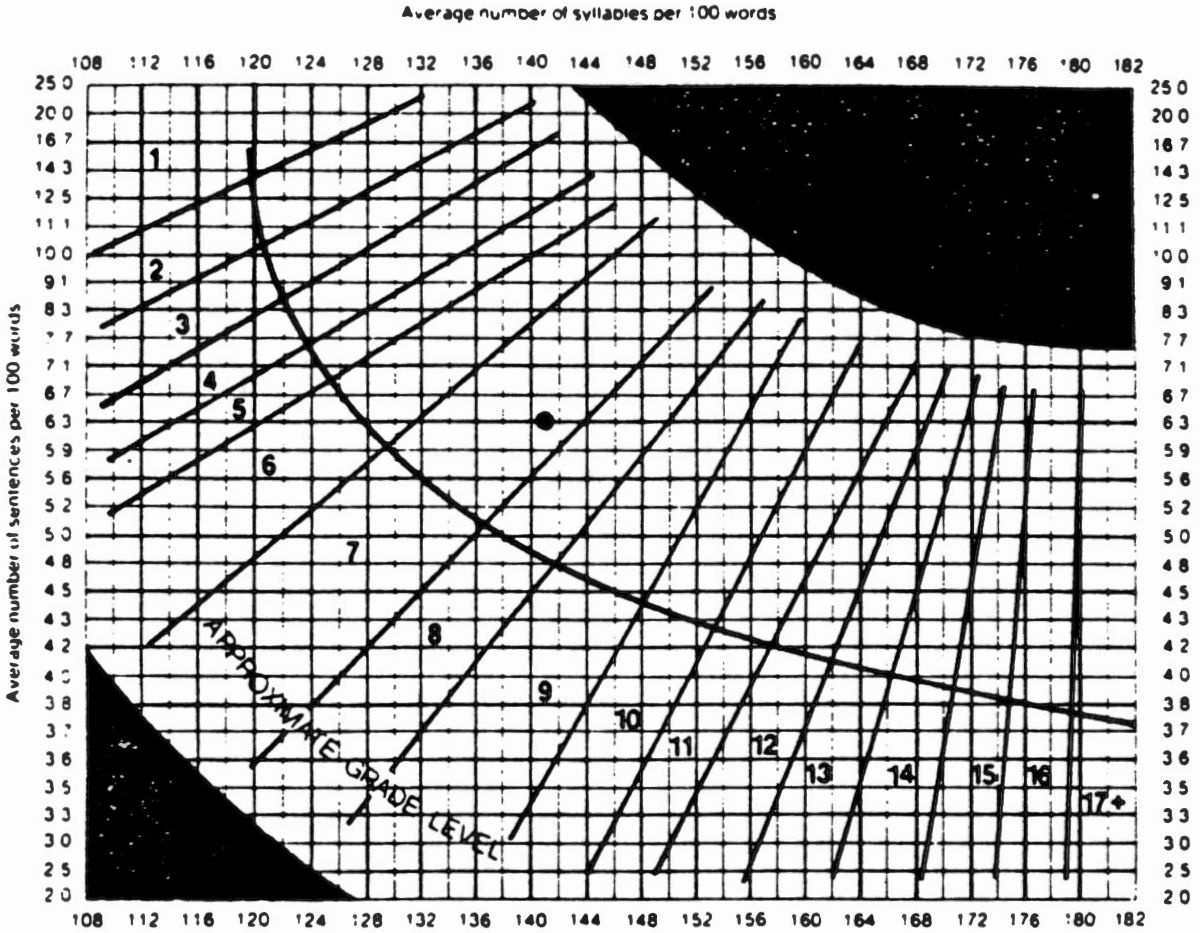
APPENDIX A

FRY'S READABILITY FORMULA

GRAPH FOR ESTIMATING READABILITY — EXTENDED



DIRECTIONS Randomly select 3 one hundred word passages from a book or an article. Plot average number of syllables and average number of sentences per 100 words on graph to determine the grade level of the material. Choose more passages per book if great variability is observed and conclude that the book has uneven readability. Few books will fall in gray area but when they do grade level scores are invalid.

Count proper nouns, numerals and initializations as words. Count a syllable for each symbol. For example, 1945 is 1 word and 4 syllables and IRA is 1 word and 3 syllables.

EXAMPLE	SYLLABLES	SENTENCES
1st Hundred Words	124	6 6
2nd Hundred Words	141	5 5
3rd Hundred Words	158	6 8
AVERAGE	141	6 3

READABILITY 7th GRADE (see dot plotted on graph)

APPENDIX B

LEARNING STRATEGY INVENTORY AND DEMOGRAPHICS

Student I.D.# or S.S.# _____

LEARNING STRATEGIES INVENTORY

Instructions: You may use a pen or pencil to complete this survey. DO NOT write your name on the survey. Your answers will be kept in confidence and will be used only for research purposes.

PART A.

1. Circle the response that indicates your sex. M - Male
   F - Female

2. Please indicate your age in years. _____

3. Write in the blank provided your best estimate of the average number of hours you study per week.

   On the average, I usually study about____hours per week.

4. Circle the letter in front of the response which indicates the place where you MOST often study.

   a. Residence hall (own room)
   b. School or public library.
   c. Student Union.
   d. Family home.
   e. Friend's home.
   f. Own apartment.
   g. Fraternity or sorority.
   h. Other (Please specify)
   _____
   _____

5. Circle the letter in front of the activity you participate most at O.S.U..

   a. Athletics.
   b. Music, drama, Band.
   c. Student professional organizations.
   d. Clubs and societies.
   e. Students government.
   f. Other (Please specify) _____

   _____

6. Do you have a job? Circle one a. Yes
b. No

7. If you have a job, circle the letter in front of the response indicating how many hours per week you work on the average.

a. 1 to 5 hours per week.
b. 6 to 10 hours per week.
c. 11 to 15 hours per week.
d. 15 to 20 hours per week.
e. More than 20 houurs per week.

PART B:

When you were studying the passage, to what extent did you use the following Methods:

ALWAYS 5 OFTEN 4 SOMETIMES 3 SELDOM 2 NEVER 1

		ALWAYS	OFTEN	SOMETIMES	SELDOM	NEVER
1.	Previewed or surveyed the entire chapter.	5	4	3	2	1
2.	Skimmed or scanned the Chapter.	5	4	3	2	1
3.	Revieved the headings and bold faced type before beginning to read the entire chapter.	5	4	3	2	1
4.	Checked to see if there was a summary before beginning to read the entire chapter, and read the summary.	5	4	3	2	1
5.	Read the discussion questions before beginning to read the entire chapter.	5	4	3	2	1
6.	Reread the chapter at least one additional time.	5	4	3	2	1

		ALWAYS	OFTEN	SOMETIMES	SELDOM	NEVER
7.	Reread the chapter several times.	5	4	3	2	1
8.	Adjusted the reading speed because your understanding of the material varied...	5	4	3	2	1
9.	Took notes while you read the chapter.	5	4	3	2	1
10.	Wrote notes in the margins of the text for important ideas	5	4	3	2	1
11.	Summarized the important ideas in your own words.	5	4	3	2	1
12.	Make up your own comprehension questions about the topics from the headings.	5	4	3	2	1
13.	Tried to memorize the important ideas.	5	4	3	2	1
14.	Paused and think about what you did and did not know about the topic before you began to read.	5	4	3	2	1
15.	Asked yourself questions about the ideas presented in the chapter prior to during, and / or after reading.	5	4	3	2	1
16.	After reading the title, you tried to predict what the passage was about, and as you read, decided if your prediction was correct.	5	4	3	2	1

APPENDIX C

INSTRUCTIONS FOR ADMINISTERING NELSON-DENNY READING TEST

NELSON-DENNY READING TEST

I GENERAL INFORMATION

Part I (Vocabulary)	15 min.
Part II (Comprehension)	20 min.*
Total	35 min.

*The first min. for timing reading (see below)

The Nelson-Denny Reading Test, Form E is composed of two subtests: Vocabulary and Comprehension. The Vocabulary section consists of 100 multiple-choice items. The comprehension section contains eight reading passages and a total of 36 multiple-choice questions. The Reading Rate Test is measured based on the reading speed of the student for a duration of 1 minute. The one minute is part of the 20 minutes of the Comprehension Test

II MATERIALS REQUIRED

1) Nelson-Denny Reading Test, Form E Booklets

2) Self-scorable Answer Sheets.

3) Stopwatch.

4) pencil or pen.

III INSTRUCTIONS TO SUBJECTS

Instructions to be read to each class to ensure uniformity.

After distributing test booklets and answer sheets, read:

"You have been given a test booklet containing questions and a separate sheet for your answers. Be sure to write only on the answer sheet. Do NOT mark on the booklet itself".

"This test is divided into 2 parts: Part I is a Vocabulary

Test containing 100 items and Part II is a Reading Comprehension Test containing 36 items. Your score is based on the number of correct responses. Therefore do not spend too much time on any one question."

" You may use either a lead pencil or ballpoint pen. Do not use a felt-tip or other soft marker. Fill in all the information except your name. Be sure to make an X in the proper box for sex and an X in the proper box for Form E of the test".

"Do not erase on the answer sheet. If you make a mistake in filling out the information box, draw a line through the error and write in or mark the correct information. If you wish to change an answer, cross out your first answer with an X and mark the answer you prefer. If you change an answer and later decide that your first answer was correct after all, cross out the second answer and circle the first answer you crossed out earlier; this will indicate that the first answer is the one that should be counted. Mark strong dark marks".

"You have 15 minutes to complete Part I, the Vocabulary Test. If you finish before the 15 minutes are up, check your answers, then close your test booklet and wait quietly."

(After 15 minutes)

"Stop. Put your pencil down and close your booklet."

"Now, turn over the test booklet to the back cover marked 'Part II. Comprehension Test and Reading Rate.'

"Look at your answer sheet and locate the section marked 'Part II. Comprehension.' at the bottom of the answer sheet. You have 20 minutes to work on Part II of the test. Turn the page of the test booklet and immediately read Passage I."

(At the end of the 1st minute)

"Stop. Mark on the line you are reading. Note the number at the right of that line. Write each digit of that number in the proper box."
"Then go on immediately with your reading."

(After exactly 20 minutes)

"Stop! Close your test booklets."

(Collect all test materials, the answer sheets first, followed by the test booklets.)

"Please remain seated until all the test materials are handed in."

APPENDIX D

NARRATIVE SELECTION AND COMPREHENSION QUESTIONS

CHAPTER III. *The Author studious to learn the language, the Houyhnhnm his master assists in teaching him. The language described. Several Houyhnhnms of quality come out of curiosity to see the Author. He gives his master a short account of his voyage.*

My principal endeavor was to learn the language, which my master (for so I shall henceforth call him) and his children, and every servant of his house were desirous to teach me. For they looked upon it as a prodigy, that a brute animal should discover such marks of a rational creature. I pointed to everything, and enquired the name of it, which I wrote down in my journal book when I was alone, and corrected my bad accent, by desiring those of the family to pronounce it often. In this employment, a sorrel nag, one of the under servants, was very ready to assist me.

In speaking, they pronounce through the nose and throat, and their language approaches nearest to the High Dutch or German, of any I know in Europe; but is much more graceful and significant. The Emperor Charles V made almost the same observation, when he said, that if he were to speak to his horse, it should be in High Dutch.[18]

The curiosity and impatience of my master were so great, that he spent many hours of his leisure to instruct me. He was convinced (as he afterwards told me) that I must be a Yahoo, but my teachableness, civility, and cleanliness astonished him; which were qualities altogether so opposite to those animals. He was most perplexed about my clothes, reasoning sometimes with himself whether they were a part of my body; for I never pulled them off till the family were asleep, and got them on before they waked in the morning. My master was eager to learn from whence I came; how I acquired those appearances of reason, which I discovered in all my actions; and to know my story from my own mouth, which he hoped he should soon do by the great proficiency I made in learning and pronouncing their words and sentences. To help my memory, I formed all I learned into the English alphabet, and writ the words down with the translations. This last, after some time, I ventured to do in my master's presence. It cost me much trouble to explain to him what I was doing; for the inhabitants have not the least idea of books or literature.

17. Gulliver's error: many animals are very fond of salt.

18. Charles was reputed to have said he would address his God in Spanish, his mistress in Italian, and his horse in German.

In about ten weeks time I was able to understand most of his questions; and in three months could give him some tolerable answers. He was extremely curious to know from what part of the country I came, and how I was taught to imitate a rational creature; because the Yahoos (whom he saw I exactly resembled in my head, hands, and face, that were only visible) with some appearance of cunning, and the strongest disposition to mischief, were observed to be the most unteachable of all brutes. I answered that I came over the sea, from a far place, with many others of my own kind, in a great hollow vessel made of the bodies of trees; that my companions forced me to land on this coast, and then left me to shift for myself. It was with some difficulty, and by the help of many signs, that I brought him to understand me. He replied that I must needs be mistaken, or that I *said the thing which was* not. (For they have no word in their language to express lying or falsehood.) He knew it was impossible that there could be a country beyond the sea, or that a parcel of brutes could move a wooden vessel whither they pleased upon water. He was sure no Houyhnhnm alive could make such a vessel, or would trust Yahoos to manage it.

The word Houyhnhnm, in their tongue, signifies a Horse; and in its etymology, the Perfection of Nature. I told my master that I was at a loss for expression, but would improve as fast as I could; and hoped in a short time I should be able to tell him wonders; he was pleased to direct his own mare, his colt, and foal, and the servants of the family to take all opportunities of instructing me; and every day for two or three hours, he was at the same pains himself; several horses and mares of quality in the neighborhood came often to our house, upon the report spread of a wonderful Yahoo, that could speak like a Houyhnhnm, and seemed in his words and actions to discover some glimmerings of reason. These delighted to converse with me; they put many questions, and received such answers as I was able to return. By all which advantages, I made so great a progress, that in five months from my arrival, I understood whatever was spoke, and could express myself tolerably well.

The Houyhnhnms who came to visit my master, out of a design of seeing and talking with me, could hardly believe me to be a right Yahoo, because my body had a different covering from others of my kind. They were astonished to observe me without the usual hair or skin, except on my head, face, and hands; but I discovered that secret to my master, upon an accident, which happened about a fortnight[10] before.

I have already told the reader, that every night when the family were gone to bed, it was my custom to strip and cover myself with my clothes; it happened one morning early, that my master sent for me by the sorrel nag, who was his valet; when he came, I was fast asleep, my clothes fallen off on one side, and my shirt above my waist. I awaked at the noise he made, and observed him to deliver his message in some disorder; after which he went to my master, and in a great fright gave him a very confused account of what he had seen; this I presently discovered; for going as soon as I was dressed, to pay my attendance upon his honor, he asked me the meaning of what his servant had reported; that I was not the same thing when I slept as I appeared to be at other times; that his valet assured him, some part of me was white, some yellow, at least not so white, and some brown.

I had hitherto concealed the secret of my dress, in order to distinguish myself as much as possible, from that cursed race of Yahoos; but now I found it in vain to do so any longer. Besides, I considered that my clothes and shoes would soon wear out, which already were in a declining condition, and must be supplied by some contrivance from the hides of Yahoos, or other brutes; whereby the whole secret would be known. I therefore told my master, that in the country from whence I came, those of my kind always covered their bodies with the hairs of certain animals prepared by art, as well for decency, as to avoid inclemencies of air both hot and cold; of which, as to my own person I would give him immediate conviction, if he pleased to command me; only desiring his excuse, if I did not expose those parts that nature taught us to conceal. He said, my discourse was all very strange, but especially the last part; for he could not understand why Nature should teach us to conceal what Nature had given. That neither himself nor family were ashamed of any parts of their bodies; but however I might do as I pleased. Whereupon, I first unbuttoned my coat, and pulled it off. I did the same with my waistcoat; I drew off my shoes, stockings, and breeches. I let my shirt down to my waist, and drew up the bottom, fastening it like a girdle about my middle to hide my nakedness.

My master observed the whole performance with great signs of curiosity and admiration. He took up all my clothes in his pastern, one piece after another, and examined them diligently; he then stroked my body very gently, and looked round me several times; after which he said, it was plain I must be a perfect Yahoo; but that I differed very much from the rest of my species, in the whiteness and smoothness of my skin, my want of hair in several parts of my

19. Two weeks.

body, the shape and shortness of my claws behind and before, and my affectation of walking continually on my two hinder feet. He desired to see no more; and gave me leave to put on my clothes again, for I was shuddering with cold.

I expressed my uneasiness at his giving me so often the appellation of Yahoo, an odious animal, for which I had so utter an hatred and contempt. I begged he would forbear applying that word to me, and take the same order in his family, and among his friends whom he suffered to see me. I requested likewise, that the secret of my having a false covering to my body might be known to none but himself, at least as long as my present clothing should last; for as to what the sorrel nag his valet had observed, his honor might command him to conceal it.

All this my master very graciously consented to; and thus the secret was kept till my clothes began to wear out, which I was forced to supply by several contrivances, that shall hereafter be mentioned. In the meantime, he desired I would go on with my utmost diligence to learn their language, because he was more astonished at my capacity for speech and reason, than at the figure of my body, whether it were covered or no; adding that he waited with some impatience to hear the wonders which I promised to tell him.

From thenceforward he doubled the pains he had been at to instruct me; he brought me into all company, and made them treat me with civility, because, as he told them privately, this would put me into good humor, and make me more diverting.

Every day when I waited on him, beside the trouble he was at in teaching, he would ask me several questions concerning myself, which I answered as well as I could; and by those means he had already received some general ideas, although very imperfect. It would be tedious to relate the several steps, by which I advanced to a more regular conversation, but the first account I gave of myself in any order and length was to this purpose:

That, I came from a very far country, as I already had attempted to tell him, with about fifty more of my own species; that we traveled upon the seas, in a great hollow vessel made of wood, and larger than his honor's house. I described the ship to him in the best terms I could; and explained by the help of my handkerchief displayed, how it was driven forward by the wind. That, upon a quarrel among us, I was set on shore on this coast, where I walked forward without knowing whither, till he delivered me from the

persecution of those execrable Yahoos. He asked me who made the ship, and how it was possible that the Houyhnhnms of my country would leave it to the management of brutes? My answer was that I durst proceed no farther in my relation, unless he would give me his word and honor that he would not be offended; and then I would tell him the wonders I had so often promised. He agreed; and I went on by assuring him, that the ship was made by creatures like myself, who in all the countries I had traveled, as well as in my own, were the only governing, rational animals; and that upon my arrival hither, I was as much astonished to see the Houyhnhnms act like rational beings, as he or his friends could be in finding some marks of reason in a creature he was pleased to call a Yahoo; to which I owned my resemblance in every part, but could not account for their degenerate and brutal nature. I said farther, that if good fortune ever restored me to my native country, to relate my travels hither, as I resolved to do; everybody would believe that I *said the thing which was not*; that I invented the story out of my own head; and with all possible respect to himself, his family, and friends, and under his promise of not being offended, our countrymen would hardly think it probable, that a Houyhnhnm should be the presiding creature of a nation, and a Yahoo the brute.

Student I. D. # .....

GULLIVER'S TRAVELS

Read the passage given and answer the following questions. Write your answer in the space provided after each question. Be brief and to the point.

1. According to the author the language of the Houghnhnms sounds similar to which language?

2. Gulliver was compared to which creature in the story?

3. Why did the Houghnhnms want to teach the Gulliver their language?

4. What are the two major differences between the Yahoos and Gulliver?

5. Summarize in 4 or 5 sentences the content of this story.

APPENDIX E

EXPOSITORY SELECTION AND COMPREHENSION QUESTIONS

Basics of the nervous system

To help understand the importance of the human nervous system, it is useful to consider for a moment how some lower organisms manage to function. A one-celled animal such as the paramecium cannot and does not possess any nervous system at all. Its entire single-celled "body" is somehow sensitive to heat and light and capable of initiating its own movements. Larger and more complicated animals, however, have to have some kind of nervous system, composed of specialized nerve cells in the shape of fibers that reach from one part of the body to another and are capable of conveying messages back and forth.

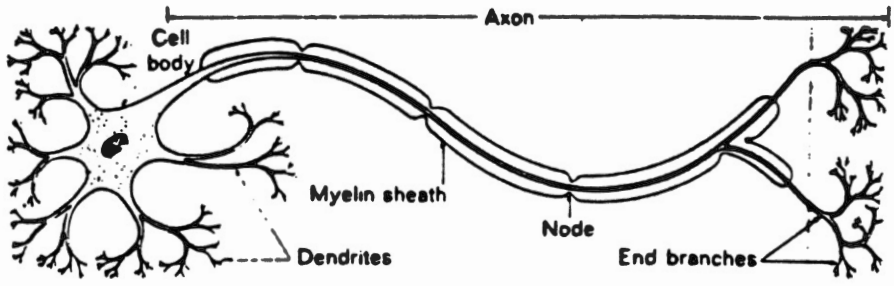
In the lowly little sea creature called the coral there is simply a network of nerves, with no particular central point. The nerves and the various parts of the body work together much like the government of a loose federation of states, each preserving considerable independence. Higher up in the scale of evolution, the network of nerves becomes more complicated and the beginnings of a central nervous system appear. The organism, it might be said, now has the beginnings of a strong central government, exercising control over all its parts. In humans, the central nervous system has reached its peak of development: a large and enormously complex brain serves as a center of power and decision that regulates the behavior of all parts of the body in the most complicated and delicate fashion.

Unlike the paramecium, we would be helpless without a nervous system. We would be unable to react to stimuli from the outside world. We would not even be able to move our muscles. Indeed we could not live at all, for our hearts would not beat and our lungs would not breathe.

The nerve cell

The basic unit of the nervous system is the individual nerve cell, technically called *neuron*, an example of which is shown in Figure 7-6. Some neurons are quite long; for example, the motor neurons that enable us to wiggle our toes extend all the way from the lower part of the spinal column to the muscles of the toes. Others, particularly in the brain, are only the tiniest fraction of an inch in length.

The neuron's *cell body*, which contains the chromosomes and genes that caused it to grow into a nerve cell in the first place, performs the work of metabolism. The *dendrites* are the neuron's "receivers"; when they are stimulated, they start a nervous impulse that travels the length of the fiber to the end of the *axon*. The speed at which the impulse travels depends partly on the size of the neuron; the greater the diameter of the fiber, the greater the speed. It also depends, to a much greater extent, on whether the neuron possesses a *myelin sheath*, as does the one shown in the figure. In neurons that have the sheath, the impulse often travels slightly faster than 300 feet a second, compared with a typical speed of only a little more than 3 feet a second in neurons without the sheath.



7-6

A nerve cell (neuron)

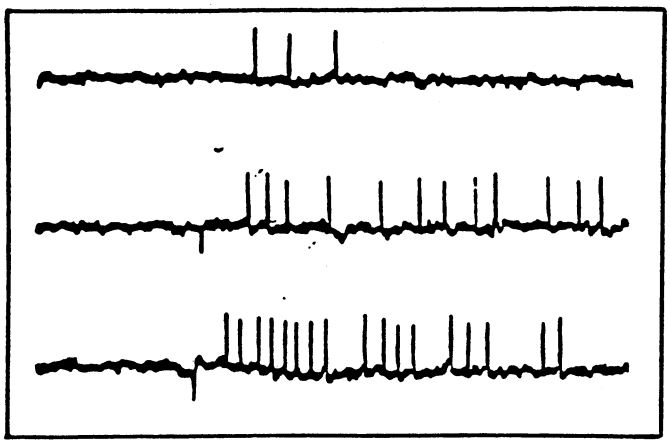
Like this motor neuron, all neurons are fiber-shaped cells with a *dendrite* or *dendrites* at one end, an *axon* at the other end, and a *cell body* somewhere in between. Stimulation of the dendrites sets up a nervous impulse that travels the length of the neuron to the end of the axon. In the case of this motor neuron, the *end branches* of the axon would be embedded in a muscle fiber, and the nervous impulse would make the muscle contract. The *myelin sheath* is a whitish coating that protects many neurons but not all. The *nodes* are constrictions of the sheath that act as relay stations to improve transmission of the nervous impulse. (4)

The nervous impulse

A photomicrograph of a nerve cell in the human spinal cord

The nature of the nervous impulse is so foreign to anything else in our ordinary experience that it is somewhat difficult to describe or to comprehend at first. It is a tiny charge of electricity passing from one end of the fiber to the other, but it does not travel like the electricity in the wires of a house—as might be guessed from the fact that electricity travels not at a mere 3 to 300 feet a second but at 186,000 miles a second. The charge can be compared to the glowing band of fire that passes along a lighted fuse, except that no combustion takes place in the neuron. What actually happens is that there is an exchange of chemical particles, carrying different electrical potentials, from inside and outside the membrane that encloses the nerve fiber. Once the nervous impulse created by this exchange of chemical particles has passed down the length of the fiber, the neuron quickly returns to its normal state and is ready to fire off another impulse.

The neuron ordinarily operates on what is called the *all or none principle*. That is to say, if it fires at all it fires as hard as it can considering its physiological state at the moment (which, in complex ways, can be altered by the messages it is receiving from other neurons). All stimuli of sufficient power set off the same kind of impulse—as strong an impulse as the neuron is capable of producing at that moment.



7-7

Records of a neuron's activity

These are tracings from an electrode that was placed on the neuron of a rat. Each upward movement of the lines shows a separate impulse. The neuron was from the rat's tongue, and the stimulus was salt solution in varying strengths. The response of the neuron to the weakest salt solution is shown in the top line. In the center line the stimulus was ten times stronger and in the bottom line a hundred times stronger. (5)

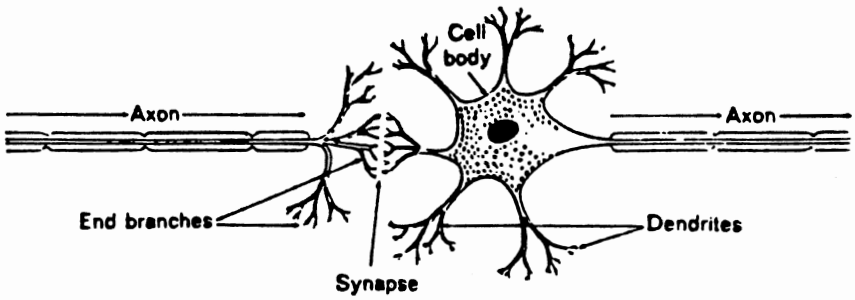
After the neuron has fired, it requires a brief recovery period before it can fire again. This recovery period has two phases. During the first phase the neuron is incapable of responding at all. During the second phase it is still incapable of responding to all the stimuli that would ordinarily make it fire, but it can respond if the stimulus is powerful enough. Some neurons have a fast recovery rate and can fire, when sufficiently stimulated, as often as 1000 times a second. Others recover much more slowly and have a top limit of only a few firings per second.

Figure 7-7 shows the actual sequence of nervous impulses in a neuron over a period of several tenths of a second. Note that each impulse was of approximately equal intensity, as measured by the height of the lines. Stronger stimuli made the neuron fire more often but not with greater intensity.

As remarkable as it may seem, those little movements in the lines in Figure 7-7 are pretty much the whole story of what goes on inside the human nervous system. The neurons fire off their tiny waves of electricity, barely enough to jolt the needle of the most sensitive recording device. For each neuron, each wave is of similar intensity; the major difference is in the number and rapidity of the impulses. Yet somehow these impulses—by the way they are routed through the nervous system and the patterns they form—manage to tell us what our eyes see and our ears hear; they enable us to learn and to think; they direct our glands and our internal organs to function; they direct our muscles to perform such intricate and delicate feats as driving an automobile or playing a violin.

The synapse and neuro-transmitters

The way one neuron connects with another is shown in Figure 7-8. The junction point, or *synapse*, marks the boundary between one neuron and the next and therefore the end of one nervous impulse and the start of a new one. The impulse of the first neuron cannot leap across the synapse; it can go only as far as the end of the axon and no farther. It



7-8

The synapse

The junction between the axon of one neuron and the axon, dendrites, or cell body of another neuron is called a *synapse*. For an explanation of what happens at the synapse, see the text.

can, however, stimulate the second neuron to fire off its own impulse, thus passing along its "message" to another link in the nervous system.

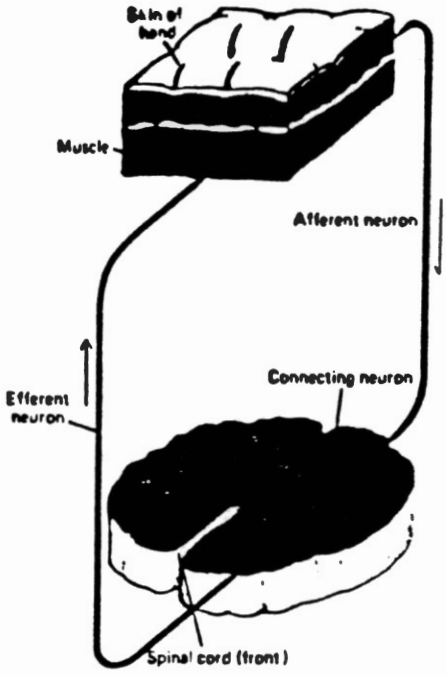
The major way that stimulation of the second neuron occurs at the synapse is through chemical action. The end of the axon contains very small amounts of a chemical substance known as a *neurotransmitter*, and when the nervous impulse reaches the end of the axon a tiny burst of this substance is released into the synapse (6).

There appear to be a number of chemicals that serve as neurotransmitters responsible for activity at the synapses in various parts of the nervous system (7). One of them, it is interesting to note, is noradrenalin—meaning that some of the neurons, though they are only single cells, are capable of producing one of the same complex chemicals manufactured by the adrenal glands. Another important neurotransmitter is called acetylcholine.

The three kinds of neurons

The neurons of the human body, which number in the billions, come in many different lengths, diameters, and shapes. They can, however, be divided into three classes.

1 *Afferent neurons.* These are the neurons of the senses. The word *afferent* is derived from the Latin words *ad*, which means to or toward, and *ferre*, which means to bear or to carry. The afferent neurons carry messages toward the central nervous system—from our eyes, ears, and other sense organs.
2 *Efferent neurons.* These carry messages *from* the central nervous system. Their axons end in either muscles or glands. Their impulses make the muscles contract or activate the glands.
3 *Connecting neurons.* These are middlemen between other neurons. They are stimulated only by the axon of another neuron. They do not end in muscle or gland tissue but only in other synapses where they



7-9
Connections for the grasping reflex

Stroking the palm of the baby's hand stimulates an afferent neuron whose axon ends inside the spinal cord at a synapse with a connecting neuron. This connecting neuron, in turn, ends at a synapse with an efferent neuron. The impulses from the afferent neuron stimulate the connecting neuron, which in turn stimulates the efferent neuron, which makes the muscle of the hand contract. Note that the afferent neuron enters the spinal cord from the back, and the efferent neuron leaves from the front. This is always the case.

stimulate other neurons to fire. Most of them, though not all, are found within the central nervous system.

A simple example of how these three kinds of neurons work together is provided by the infant's grasping reflex, illustrated in Figure 7-9. As will be seen, the nervous messages that produce the reflex begin with the stimulation of an afferent neuron, which in turn stimulates a connecting neuron, which in turn stimulates an efferent neuron—whose impulses cause the muscle to contract.

Multiple nerve connections

Most synaptic connections between neurons, especially the connecting or "middleman" neurons, are far more complicated than the diagrams shown up to this point would suggest. Indeed a synapse can best be thought of as a complex switching point where not just two but many neurons make contact, in the most elaborate kind of way. The axon of each of the many "incoming" neurons that deliver messages at the synapse has many branches, each terminating in a synaptic knob as shown in Figure 7-10. These knobs, which contain the neurotransmitter

7-10
The synaptic knobs

This photograph, shown at a magnification of about 2000 times life size, is the first ever made of the synaptic knobs of a neuron. The photograph is of the neuron connections in a snail. (8)

substance, are usually in contact with the dendrites of a large number of "outgoing" neurons. But, to further complicate the picture, some of the synaptic knobs are in contact with the cell bodies of the outgoing neurons, which can be stimulated directly as well as through the dendrites.

Thus each incoming neuron may deliver its message, in the form of its neurotransmitter, to scores or perhaps even hundreds of outgoing neurons. Similarly, each outgoing neuron may receive messages from scores or hundreds of incoming neurons. The outgoing neuron, moreover, does not always respond in the same way to the messages it receives. How it responds depends on where it is stimulated. At some of the many locations, or "receptor sites," where it makes synaptic connections with incoming neurons, stimulation by the neurotransmitter tends to make it fire off its own impulse. At other "receptor sites" the neurotransmitter tends to inhibit it from firing (9).

Ordinarily an outgoing neuron will not fire as the result of a single message arriving at one of its many dendrites or its cell body. Instead the firing process requires multiple stimulation—a whole group of messages arriving at once or in quick succession from several or even a great many of the incoming neurons with which it is in contact at the synapse. Moreover, the messages that it interprets as signals to fire must outweigh any messages that inhibit it from firing.

Thus the multiple connections at the synapses provide an almost astronomical number of possible pathways. The nervous impulses arriving from the incoming neurons may not "get through" at all. They may be too few in number or too far apart in time to fire any of the outgoing neurons, or incoming messages tending to fire the outgoing neurons may be canceled out by messages that inhibit firing. At times the incoming nervous impulses may be of such a number and such a pattern as to fire a single outgoing neuron but no more. At other times several or many outgoing neurons may be fired. The particular ones that are stimulated into activity may vary. So may the number of impulses they fire and the rate at which they fire.

All this means that no new impulses at all may be set up at the synapse, or that new impulses may travel in any one of many directions or in several directions at once. The new impulses that go along to the next switching point or points in the nervous system may be few or many, slow or rapid. Small wonder that the human nervous system is capable of so many accomplishments. By comparison, the nation's telephone network is just a child's toy.

Student I. D. # .....

BASICS OF THE NERVOUS SYSTEM

Read the given passage and answer the following questions. Write your answers in the space provided after each question. Be brief and to the point.

1. Which organ in the human system is complex and serves as a center of power, and makes decisions which regulates the behavior of all other parts of the body?

2. What is a neuron?

3. Give a concise description of a neuron.

4. Trace the function(s) of a neuron.

5. Name the types of neurons in the human body.

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