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The Effectiveness of Study Skills Training for Students of Different Personality Types and Achievement Levels

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THE EFFECTIVENESS OF STUDY SKILLS TRAINING FOR STUDENTS OF DIFFERENT PERSONALITY TYPES AND ACHIEVEMENT LEVELS

by

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VITA

The author, Kathleen M. Rusch, is the daughter of Herbert F. Cowdell and Doris (Porter) Cowdell. She was born June 19, 1955, in Lowell, Massachusetts.

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CHAPTER I

REVIEW OF THE RELEVANT LITERATURE

The Problem of Poor Academic Achievement

The failure of college students to achieve in the classroom is a problem that faces virtually every university. Many students begin their college careers only to find that the methods of study that may have served them well throughout their high school years are simply inadequate to meet the demands of a university setting. Townsend (1956, p. 112) has said, "Many of the reading skills, habits and attitudes which are effective in producing good high school achievement are inadequate tools for college reading, even though ... they are constantly in use."

The effects of poor academic achievement on the students themselves has often been noted. Maxwell (1979) described feelings of inadequacy, depression, anxiety and anger that often result from a failure to achieve in the university setting, coupled with an uncertainty as to how to improve one's grades. Johnson (1981) found that students who had experienced repeated academic failure despite efforts to improve began showing symptoms of a phenomenon known as "learned helplessness," (Seligman, 1975), considered by many to be a factor in clinical depression. These symptoms included low self-esteem, feelings of loss of control over unwanted outcomes and general passivity with respect to changing negative forces in their environment. Support for this notion was provided by Butkowsky and Willows (1980) who noted that students with a history of poor academic achievement tended to display lower estimates of success on academic tasks, less persistence in the face of failure and greater attribution of failure to lack of ability and of successes to factors beyond personal control.

Covington and Omelich (1979a, 1979b) found that, while initially students tended to attribute their lack of academic success to external factors, e.g., bad luck, unfair test, when this lack of success persisted, they began attributing causes of failure to their own lack of ability. This was especially true when they were expending considerable effort to improve their performance. The more these students failed and the fewer the number of possible external excuses for failure the more the attributions of low ability tended to be made. Covington and Omelich (1979a) concluded that, in order to avoid attributions of this type students might tend actually to prepare less adequately for examinations than they believed they should, so they could use their lack of preparation as a way of avoiding the conclusion that they lacked ability.

This process then would appear to set in motion a self-defeating cycle in which a student first experiences failure, then attempts to attribute it to factors external to his/her own ability. As he/she tries harder to improve, the external attributions become increasingly more difficult to maintain. As a result, the student begins to feel incompetent. Then, to avoid this attribution, he/she begins to expend less effort to do well, and, finally, since the student is studying less, he/she continues to experience failure. To further complicate the cycle, Covington and Omelich (1979b) point out that teachers often will react more positively to students they feel are trying to improve their grades, making it even less likely that poorer students who may have given up trying will break the failure cycle.

Interventions Designed to Improve Students' Achievement

Given this situation, the identification of methods to help students improve their academic performance would appear to be a valuable area of research. Sappington, Fritschi, Sandefer, and Tauxe (1980) point out, however, that many teachers and administrators tend to ascribe students' poor academic achievement to low intelligence and other relatively enduring characteristics of the individual. Nevertheless, the authors believe that there is an advantage to conceptualizing the problem in terms of specific studying behaviors, since these may be more easily modified than more global personality and aptitude characteristics. One such strategy aimed at improving students' study habits was introduced by Robinson (1970). This approach, called the SQ3R method, consists of five steps: Survey, Question, Read, Recite and Review.

Surveying, which is done very briefly, consists of skimming over the material to be read before one actually begins to read it in order to get a sense of the "core ideas" upon which the passage will focus. Questioning involves turning each paragraph heading or sub-heading into a question as it is read, allowing the student to discriminate important points from peripheral ones. Reading then requires the student to answer the question raised in the heading above. Robinson (1970) describes this stage as "not a passive plodding along each line, but an active search for the answer" (p. 33). The next step in the method, Reciting, would have the student look away from the passage and attempt to answer the question from memory, preferably using his/her own words and an example. The student should continue along in this manner until all the sections of the passage have been covered. The final step, Reviewing, encourages the student to then go back over each of the subheadings in the chapter and attempt to recite from memory the main points contained in that section.

Since its introduction in 1945, Robinson's SQ3R approach has been widely cited and apparently often used to modify students' study habits. Alternative methods (e.g., Higbee, 1977; Johnson, Sternglanz, & Springer, 1982) all tend to incorporate, to a greater or lesser extent, the five components described by Robinson. However, despite its wide use, very little has been published evaluating the effectiveness of the method for improving students' study habits and/or their test grades. Robinson himself provided three examples of situations in which the SQ3R approach was reportedly successfully employed to improve students' reading comprehension and their scores on quizzes, but these examples are presented more as anecdotal evidence than as solid empirical support for the method's effectiveness. The apparent face validity of the approach may have made more objective, controlled evaluations of its merits through the years appear a bit redundant. Nevertheless, since the approach is so widely promoted, studies of this type would seem to be essential.

<u>Peer Instruction and Modeling Approaches</u>

The problem of improving students' academic performance has been approached from a number of other perspectives as well. Fraser, Beaman, Diener, and Kelem (1977) implemented a peer-monitoring system whereby students in a large college class who were having difficulties academically were paired with students from the same class who were doing well. Students in this study were informed that their final grades in the course would be determined by the average of their individual performances. Results indicated that 87% of the students involved in these learning teams received at least a B for a final grade, compared with only 50% of the students in a control class operating on traditional grading principles. Thus, the poor-achieving students appeared to be gaining something from their more successful colleagues, although the methods used to effect improvement were not investigated. In a second experiment, the authors found that adding two or three additional students to the pair improved all the members' performances over what they had been individually, although the performance of students in the larger groups did not differ from that of students in pairs.

Fremouw and Feindler (1978) also supported the notion that peers can be successful models for improved academic achievement. In this study freshmen responding to an advertisement for a study skills improvement program were taught the same study skills by either a professional staff member or another freshman volunteer. Results indicated significant improvement in study skills and grade point average for both training groups relative to attention and waiting-list control groups. There was no significant difference in study skills or grade point average between the two training groups. That is, those subjects taught by their peers improved as much as those taught by professional staff members.

Jackson and Van Zoost (1974) found that an approach based on students teaching peers to improve their study habits may be even more helpful for the tutors than a conventional study skills program. In this study students who responded to an advertisement for a study skills program were told at the beginning of the first session that they were to find a friend, roommate or sibling who would be their pupil in study skills. Students in another group received the same instruction in study skills but were not required to teach what they learned to someone else. Results demonstrated that, while both groups improved significantly over their own pre-training study habits, students who taught what they learned to someone else showed significantly greater improvement. Thus, it appears that students teaching other students ways of improving study skills can result in better performance for both teachers and pupils.

Personal Counseling Approaches

In addition to peer instruction, receiving general personal/emotional counseling has also been shown in some cases to result in improved academic performance. Pinto and Feigenbaum (1974) studied the academic achievement of college students who received counseling directed toward improved personal adjustment. Academic or study skills counseling was not included in these students' treatment. While the authors found no overall main effect for improved academic achievement as a result of personal counseling, they did find an interaction effect among levels of experience of the counselors. Students who worked with a more experienced counselor did show significant improvement in grade point average, while students who worked with a relatively inexperienced counselor actually had a significant decrease in achievement during the semester in which the counseling took place. However, in the latter case there followed a gradual return to pre-counseling levels in subsequent semesters. The authors concluded that improved academic performance can occur as a result of personal counseling when the amount of the counselor's experience is taken into account.

Behavior Modification Approaches

Another approach to improving students' academic achievement has been to combine training in study skills (usually some variation of the SQ3R method discussed above) with various behavioral techniques designed to increase students' adherence to the principles of effective studying that they are being taught. In one such study Goldman (1978) found that students who signed a contract identifying specific studying behaviors that they wished to work on showed significantly greater improvement in grade point average and attitudes toward studying than either students who received study skills instruction but did not sign contracts (no improvement), or control subjects who received no treatment (no improvement). Goldman believed that the contracts served as a public commitment on the part of students to changing the identified behaviors, as well as placing the responsibility for making the changes with the students themselves. A follow-up study showed that the contract students had managed to maintain the gains made at the time of treatment even as long as two years post-treatment.

Another behavioral technique that has been found to improve students' academic performance when combined with study skills training is self-monitoring and self-recording of study time. Mount and Tirrell (1977) trained students to monitor the amount of time they spent studying for a psychology class and to record these data either on note cards only, on graph paper only, or on both note cards and graph paper. Another group of students was trained to monitor the time that they were not studying and were feeling guilty as a result, and to record these data in one of the three ways mentioned. Self-monitoring in both groups resulted in improved achievement, with the highest scores obtained by the students who used the combined procedure to record the data from their self-monitoring. Surprisingly, there was no difference found in the examination scores of the subjects who used study time as their target behavior and those who used guilt time. The authors suggested that this may have been because both procedures forced students to become aware of how much time they were spending (or not spending) studying, which, for the guilt-monitoring subjects, may have led them to conclude that they needed to spend less time feeling guilty and more time studying.

The value of self-monitoring as an aid to improved academic performance was further explored by Richards, McReynolds, Holt, and Sexton (1976). These authors believed that the improvement in study behavior that results from self-monitoring is due at least in part to the feedback that it provides to the students about the extent of their study time. They hypothesized that the benefits to students of self-monitoring of study behaviors could be enhanced by manipulating the quality and quantity of this information feedback. Subjects in this study were students who were concerned about improving their study habits. They were assigned to conditions requiring either gross or fine monitoring of study behaviors (fine = self-recording the exact number of pages read each day on cumulative graphs; gross = self-recording "0," "1-50," or "over 50" pages read each day on noncumulative graphs). Finally, students were classified on the basis of a pre-treatment questionnaire into those who were well-informed about their own study behaviors and those who were poorly-informed. Results showed that self-monitoring plus study skills training improved students' grades on the final exam in the class more than study skills training alone. In addition, those students who had been poorly informed prior to training about their own study habits showed greatest improvement from self-monitoring. The type of monitoring involved (i.e., fine vs. gross) did not appear to make a difference in final exam performance. The authors concluded that the reason self-monitoring seems to enhance benefit from study skills training is because it provides students with accurate feedback about their current study habits and what they are doing to improve them.

Other studies have compared the benefits of self-monitoring with those of various other behavioral techniques when combined with study skills training. Richards (1975), for example, compared self-monitoring and various stimulus control techniques (e.g., instructions on making the physical environment where studying was done more conducive to concentration, eliminating distractions, etc.). He found that self-monitoring, when combined with study skills training, was more effective than stimulus control techniques. Moreover, the combination of study skills plus self-monitoring plus stimulus control was no more effective than study skills plus self-monitoring alone.

Greiner and Karoly (1976), on the other hand, trained students in the SQ3R method and, in addition, gave some of them training in self-monitoring, others in self-reward, and others in planning strategies (e.g., breaking large tasks down into smaller, more manageable units, etc.). One group of students received training in all three behavioral techniques and a fifth group served as a control, receiving only study skills training. Results indicated that the students receiving instruction in all three behavioral strategies received higher scores than any of the other groups on a study habits inventory, indicating greater improvement in study habits. The other treatment groups in this study did not differ among themselves. Greiner and Karoly concluded that the technique of planning, not included in Richards' study, may be the critical component in improved performance from behavioral techniques and may have an interactive effect on other behavioral strategies with which it is employed simultaneously, thus increasing the potency of the entire self-control sequence.

Approaches to Decrease Test Anxiety

Other approaches to improving students' academic performance have also been considered. Cornish and Dilley (1973) directed their intervention at decreasing the levels of test anxiety in students with poor academic achievement. This study compared systematic desensitization, implosive therapy (Stampfl & Levis, 1967) and study skills counseling (not described further) in the treatment of students with poor academic performance and high levels of test anxiety. Results indicated that, while systematic desensitization was found to be the most effective of the three treatments for decreasing test anxiety, students in the study skills treatment showed the greatest increase in academic performance. This study, however, did not utilize any combined approaches (e.g., study skills plus anxiety treatment).

A study that did examine combined effects and further explored the role of anxiety in poor academic achievement was performed by Lent and Russell (1978). This study compared students taught a study skills strategy alone with those taught either study skills plus systematic desensitization or study skills plus cue-controlled desensitization (a procedure developed by the authors combining autogenic relaxation and systematic desensitization). Results showed that both multicomponent groups earned significantly higher grade point averages post-treatment than subjects receiving study skills training alone. No significant difference was found between the two multicomponent procedures, however.

Mitchell, Hall, and Piatkowska (1975) further examined the relationship between poor academic achievement and test anxiety. Students in this study received study skills training plus either systematic desensitization designed to decrease their anxiety reactions to tests and to specific academic situations or generalized relaxation training without specific target behaviors. Results indicated that combining study skills training with desensitization training to specific situations resulted in greater improvement than either study skills training alone or study skills training plus generalized relaxation training. The authors point out that for some students accustomed to poor achievement the testing situation may have acquired anxiety-arousing properties which may not be dealt with adequately by programs emphasizing study skills training alone. Looked at from this perspective, it may be that studies in which students were taught various behavioral techniques for self-control, such as planning (Greiner & Karoly, 1976), may have been addressing students' high anxiety levels by providing them with concrete, behavioral methods of managing their study time. In this way, some of the uncertainty and ambiguity surrounding the studying process, which may have previously contributed to their high anxiety levels, may have been eliminated.

Also of concern to investigators in the area of improving students' performance is the permanence of gains made as a result of various treatments. If a given treatment could be shown to improve academic achievement and maintain this improvement over time, for example, it would seem to be a more effective method than one whose gains proved only temporary. Richards and Perri (1978) investigated the maintenance rates of three different procedures: study skills training alone (SQ3R method), study skills training plus behavioral problem solving (D'Zurilla & Goldfried, 1971) and study skills training plus faded counselor contact (progressively less and less contact with counselors across time). Only the combination of study skills training plus behavioral problem solving proved to produce effects that were maintained at one year post-treatment. Thus, the technique of problem-solving would appear to have merit when combined with study skills training in maintaining improvement in academic performance. However, little else has appeared in the literature investigating the importance of this technique.

Problems With These Studies

The problem of improving college students' academic achievement has been approached from a number of different perspectives. Interventions have focused on a fairly wide range of student characteristics, including those focusing on study habits alone (Robinson, 1970), peer modeling alone (Fraser et al., 1977), emotional adjustment alone (Pinto et al., 1974), combinations of study habits and emotional factors (Lent et al., 1978; Mitchell et al., 1975), and combinations of study habits and other behaviors such as self-control factors (Richards, 1975; Richards et al., 1976; Greiner et al., 1976; Mount et al., 1977; Goldman, 1978). The one general conclusion that would appear to be supported by virtually all the studies is that many students with a history of poor academic achievement can be taught to improve their grades within a relatively brief period of time.

The specific techniques necessary to effect improvement, however, as indicated above, are in dispute, with certain studies reporting contradictory findings with respect to certain methods. For example, studies comparing standard study skills training alone with various combinations of study skills plus other treatments such as self-monitoring or relaxation training have found different outcomes for the study skills alone treatment groups. Some studies (Richards, 1975; Richards et al., 1976; Robyak & Downey, 1978) have found that students receiving study skills training alone did significantly improve their grades over no-treatment control groups, while others (Mitchell et al., 1975; Lent et al., 1978; Sappington et al., 1980) reported changes in grades only for those students who received a multicomponent intervention and not for students who received study skills training alone. In addition, those studies that have reported significant improvement from study skills training alone have differed in their conclusions regarding whether greater improvement occurs with the addition of the other components. Some studies (e.g., Allen & Desaulniers, 1974) have found no additional improvement in grades over that effected by study skills training alone, while others (e.g., Richards, 1975) reported that the multicomponent interventions did improve achievement above and beyond that resulting from study skills training alone.

One possible explanation for the uncertainty surrounding these two issues is that the term "study skills training" has rarely been defined, nor the methods comprising it elaborated. Many studies (e.g., Fretz et al., 1967; Cornish et al., 1973; Robyak, 1977; Robyak et al., 1977) have failed to provide even minimal descriptions of the content of the study skills training programs they employed, often referring to them in a very general way (e.g., "a university study skills course," Robyak et al., 1977). In addition, even those studies that have provided some information regarding the techniques used to train students in study skills have often made those descriptions so brief as to be unreplicable (e.g., "instruction in test preparation and test-taking behaviors," Lent et al., 1978). Finally, a third group of studies has relied on the SQ3R approach or some variation thereof (Richards, 1975; Richards et al., 1976; Greiner et al., 1976). As mentioned earlier, this approach, though widely used, has not been tested empirically. In addition, the SQ3R approach consists of several different techniques such as Surveying and Asking Questions. At present it is not known whether some of these techniques might be more effective than others, whether all five of the techniques recommended by Robinson are actually necessary to bring about improved performance, or whether the SQ3R method may be more effective with certain types of students than with others. Each of these questions would appear important, yet, up to the present time the SQ3R approach has not been subjected to a well-controlled laboratory evaluation that might allow them to be answered. This problem, as well as the failure to describe adequately the study skills methods employed, as indicated above, have undoubtedly contributed to the ambiguous and at times conflicting results reported in the literature.

Another possible contributing factor would seem to be the apparent lack of consideration of the type of test for which students are preparing, and the potentially different effects of various study skills approaches for each of these types. It has long been established in the learning and memory literature, for example, that students tend to use different strategies when preparing for a multiple choice (i.e., recognition) test than they do when preparing for an essay or short answer (recall) test (Kinney & Eurich, 1932; Meyer, 1934, both cited in Zechmeister & Nyberg, 1982). In fact, Meyer (1934) found that performance on one kind of examination may suffer if students expect and prepare for the other. It would seem logical then, that certain kinds of procedures might be more effective in helping students prepare for a recall examination, for example, than for a recognition one. Peterson (1979) found that some students exposed to different styles of classroom instruction responded differently depending on whether they were tested via a multiple choice test or an essay test. However, in apparently none of the studies investigating academic improvement based on study skills training has the type of test for which the student is preparing been considered. This may be another reason for the discrepant outcomes of certain studies as mentioned above.

One final problem with the approaches that have been developed to help students improve their academic achievement is that they have tended to treat all students in the same way, i.e. to assume that all students who are achieving poorly are doing so for the same reason and, hence, require the same intervention in order to improve. The attempt seems to have been to identify the single most effective approach and then to teach it to all the students who are experiencing academic difficulties. Mitchell et al. (1974), commenting on the general stage of research in study skills improvement strategies, stated,

> ... most research into the treatment of underachievement tends to seek an answer to a very general question, 'Does treatment contribute to improved academic performance?' The answers to simple treatment questions of this kind are confounded because such questions imply a questionable homogeneity of client, counselor and treatment variables and hence do not clarify the effects of treatment. (p. 494)

Indeed, Bednar and Weinberg (1970) and Kirschenbaum and Perri (1982), in their respective reviews of academic improvement studies, each conclude with several global recommendations for all programs to improve academic underachievement. These reviewers apparently failed to consider that there may, in fact, not be one program that will be effective with all students in all situations, but rather several approaches, each of which may be effective for a given student in a particular situation.

Suggestions for Improvement in Future Studies

That treatments should be designed with the characteristics of the subjects taken into account has been suggested by Cronbach (1957, 1975). Cronbach was critical of the practice of implementing one treatment for all subjects regardless of their personal characteristics. He said, "In general, unless one treatment is clearly best for everyone, treatments should be differentiated in such a way as to maximize their interaction with aptitude variables." (1957, p. 681). Furthermore, he added, "The greatest social benefit will come from applied psychology if we can find for each individual the treatment to which he can most easily adapt." (1957, p. 679). In his more recent article, Cronbach (1975) elaborates on this point by contrasting the experimental procedures of the social scientist with those of the physical scientist.

> The ... asset of the animal experimenter is that the system he investigates can usually be isolated. Effects are rarely sensitive to what is happening outside the laboratory room. What happens to one animal is not usually allowed to influence the behavior of the others. But the human subject's reaction in the experiment is influenced by his past and recent experiences elsewhere, and by what he has heard about psychologists. (p. 122)

Further support for the notion of Aptitude x Treatment interactions was supplied in a study by Peterson (1979). In this study college students from four sections of an educational psychology course were first administered a variety of aptitude and personality tests, and then subjected to one of four teaching styles. The teaching styles included high- or low-structure and high or low class participation. In the high-structure conditions, the instructor stated the objectives of each day's lesson, emphasized important points, gave clear signals when one part of the lesson ended and another began, reviewed the previous day's material at the beginning of each lesson and previewed the next day's lesson at the end of each lesson. At the beginning of the course, the instructor handed out a syllabus with specific topics and assigned readings for each day. In the low structure conditions, the instructor handed out a syllabus with assigned readings for each day but with no topics, and engaged in none of the structuring behavior described above. In the high participation conditions, the instructor asked many questions to elicit responses from students, and encouraged and responded to students' questions. In the low participation treatments, the instructor asked few questions of students, did not encourage students' questions, and used explanations or lecturing to present content. At the end of the course all students were administered the same final examination. Results indicated no main effect on exam scores for teaching style but a significant Aptitude x Treatment interaction. Students who scored high on the Achievement via Independence subscale of the California Psychological Inventory appeared to benefit most from the low structure/high participation style and students scoring low on Achievement via Independence benefitted least from the low structure/ high participation style. Peterson concluded that her results supported Cronbach's belief regarding the importance of Aptitude x Treatment interactions and recommended that researchers narrow their focus to include such paradigms.

Sternberg and Weil (1980) further reinforced this notion in their study of Aptitude x Treatment interactions in the teaching of various strategies of syllogistic reasoning. Subjects in this study were first administered a variety of mental ability tests, some of which measured verbal ability and some of which measured spatial ability. They were then taught one of four strategies for solving syllogistic reasoning problems, each utilizing different combinations of verbal and spatial reasoning. Results demonstrated high correlations between subjects' aptitudes as measured on the pre-tests and their success with certain strategies. The authors' conclusions supported the value of Aptitude x Treatment interactions for the study of the efficacy of various forms of instruction.

Additional support for Cronbach's position has been found for several other Aptitude x Treatment interactions including: Anxiety x Method of Instruction on course achievement (Tallmadge & Shearer, 1971), Impulsivity x Type of Task on verbal learning (Rhetts, 1974), Cue-attendance (attendance to details of a pictorial stimulus) x Method of Presentation on acquisition of a motoric skill (Salomon, 1973), Intelligence x Type of Practice on verbal problem solving (Skanes, Sullivan, Rowe and Shannon, 1974), and Level of Prior Achievement x Amount of Structure on reading performance (Tobias & Ingber, 1976). Thus, the notion that certain subject characteristics might interact with certain study skills techniques to produce differences in students' academic performance does not seem without empirical foundation.

Characteristics of Successful Achievers

Studies investigating characteristics of high- and low-achieving students have produced interesting results. Schmeck, Ribich and

Ramanaiah (1977), for example, studied depth of processing of information in high- and low-achieving students. They dichotomized styles of processing into deep and shallow. According to the authors, deep processors tended to spend more time thinking about new information and less time repeating it, a behavior more characteristic of shallow processors. Deep processors also tended to organize information into conceptual chunks and to compare and contrast concepts at various levels of abstraction. They were more likely to put to-be-remembered concepts into their own words, to associate them with words and ideas that they already knew, and to think of practical applications for new concepts. Finally, deep processors tended to encode information both verbally and diagramatically. Shallow processors, on the other hand, tended to attend more to the physical properties of new information such as the sound of the words, and less to the deeper aspects, such as the meaning and chain of associations elicited by them.

In terms of actual studying behaviors, deep processors were more likely to make charts and diagrams to help them remember the material, to maintain a daily schedule of study hours, to have a regular place to study, to make up lists of probable questions and answers prior to a test and to have frequent review periods throughout the course of the semester. Shallow processors, on the other hand, tended to cram for examinations, to keep separate information from different sources in a course (e.g., lectures, textbook, other readings), to have difficulty getting started studying and to rarely read beyond what has been assigned.

In a study of the relationship between level of processing and academic achievement, Schmeck and Grove (1979) found significant positive correlations between grade point average and depth of processing and between composite ACT scores and depth of processing. (Depth of processing was measured via the Inventory of Learning Processes, an instrument developed for this purpose by Schmeck et al., 1977). The authors concluded that deep processing is conducive to effective performance within the educational setting. Thus, it would appear that one distinguishing characteristic of many successful academic achievers is that they tend to process material in a qualitatively different, and "deeper" manner than do less successful students.

Other investigations have focused on differences in personality between high- and low-achieving college students. Weiner and Potepan (1970) examined the personalities of students who were performing at either extremely high or extremely low levels. They found that for male students academic excellence was associated with low test anxiety, high achievement motivation, attribution for success to both effort and ability, and a belief that failure was not caused by lack of ability. These variables did not discriminate successful from unsuccessful females, however.

Robyak and Downey (1979) examined personality characteristics of both underachieving and non-underachieving students enrolled in a study skills course. They found that the quality of introversion, first introduced by Jung (1923), and described as a tendency to focus attention on the inner world of concepts and ideas, successfully differentiated the two groups of students, with the higher achieving group appearing more introverted. Since both groups admitted to poor study habits, yet one was not suffering academically as a result, the authors suggested that the personality variable of introversion might allow the non-underachieving students to be less dependent on actual recommended study behaviors since they would engage in much of the analysis of ideas and critical reflection internally. The underachievers, more extroverted, would be lacking this tendency, so their poor study habits would have more negative consequences academically.

A concept related to, yet slightly different from, that of introversion-extroversion is locus of control (Rotter & Mulry, 1965; Rotter, 1966). This variable refers to the amount of control a person feels that he/she has over the environment. The relationship of this variable to academic achievement was explored in a study by Gozali, Cleary, Walster, and Gozali (1973). This study found no differences in grade point average for the internal vs. the external subjects, but did find that the internal subjects used their time on a laboratory test of verbal ability in a manner more systematically related to item difficulty. Subjects in this study were administered a computer-recorded test of verbal ability and their response latencies for each item were recorded. Subjects with internal locus of control tended to spend more time on the more difficult items, while those with external locus of control showed no such pattern. The authors suggested that, since efficient use of time is often important in achievement test performance, two individuals with the same achievement level but differing in locus of control might obtain different scores on achievement tests as a function of their locus of control difference.

Another study investigating the relationship between personality variables and study habits was performed by Rutkowski and Domino (1975).

These authors found that students scoring high on a study habits inventory indicating effective study skills also had high scores on personality scales of socialization, maturity and responsibility. Students with good study habits were described as,

> of an active and participative temperament, conscientious and responsible, showing a good deal of self-control and tolerance, diligent, well-organized, resourceful, but rather cautious and methodical. (p. 787)

Other studies have focused on personality correlates of low-achieving students. As mentioned at the beginning of this review, students who receive low grades tend, relative to higher achievers, to be more depressed (Butkowsky et al., 1980; Johnson, 1981), anxious (Maxwell, 1979), to have poorer self-concepts (Butkowsky et al., 1980), and generally, after repeated failures, to attribute the failures to lack of ability and their success to external factors, such as luck or an easy test (Butkowsky et al., 1980).

A few studies have looked at the personality characteristics of students who improve from study skills courses. Fretz and Schmidt (1967) looked at the grade point averages of entering freshmen who participated in a university study skills course (not described further). They found that those who improved their grade point averages over the course of their freshman year had higher scores on the judgment (coming to conclusions) - perception (becoming aware) dimension of the Myers-Briggs Type Indicator, with the improvers relying significantly more on judgment than the nonimprovers. The authors concluded that this finding was not surprising and speculated that less organized, vascillating types of students might find a study skills course focused on methods of organization and attention to task incompatible with their own basic personality styles.

This result was supported in a study done by Robyak and Downey (1978). This study classified students enrolled in a study skills course as either underachievers or "academically apprehensive", i.e., students who enter study skills courses exhibiting emotional conflicts similar to underachievers but without a history of underachievement. The students were also administered the Myers-Briggs Type Indicator. Results indicated that the students classified as judgers reported significantly better study habits and higher grade point averages. No interaction was found between personality variables and achievement level in terms of improvement from study skills training.

Seni, Gadzella, Goldston, and Zimmerman (1978) restricted their focus to students scoring high in internal locus of control as measured on the Rotter I-E. They reported improvement in study habits of one group of these students that was exposed to a study skills training program and a concomitant decrease in the quality of study habits of control students not participating in the program. Scores on a study habits inventory increased linearly over the course of the semester for students in the training group but decreased, also linearly, for control students. The authors concluded that internally-oriented subjects who are exposed to effective study techniques may develop more confidence as the semester goes on and therefore be more motivated to try some of the techniques suggested in the study skills course.

Thus, while most authors seem to agree that there is a relationship between personality variables and various factors relevant to successful academic achievement such as grade point average and efficient study habits, the exact nature of the relationship, the specific personality variables involved and the extent of their importance in predicting academic achievement and benefit from study skills training programs appears uncertain. One possible reason for this uncertainty is that many of the studies investigating personality - achievement relationships have tended to use only one measure of personality, either by employing an instrument that measures only one construct (Gozali et al., 1973; Robyak et al., 1979) or by employing only one instrument with several subscales (Rutkowski et al., 1975). It would appear that in order to get an accurate and more thorough representation of the role of personality factors in academic achievement, many different variables would need to be sampled with a variety of instruments. This method would seem to make more likely the development of a personality profile for the higher- and lower-achieving student, which, in turn, would assist professors and counselors in their attempts to develop appropriate academic improvement programs for the lower achievers. This approach would also appear to be in agreement with Cronbach's call for treatments suited to the needs of those receiving them. This approach will be employed in the present study.

Plan of Research of Present Study

As indicated earlier in this review, previous studies evaluating the merits of study skills training programs have often been unclear about the specific techniques employed to train students. In those studies that have described the methods used, the approach has often been a variant of the SQ3R approach proposed by Robinson (1970). As mentioned, this approach, though widely used, lacks empirical verification of its validity. In addition, it is presently not known which of the five techniques suggested by Robinson are most important for actual improvement. Results of Schmeck's studies examining levels of processing would suggest that, in addition to performing the Surveying, Asking Questions, Reciting and Reviewing functions suggested by Robinson, efforts should also be made to engage in deep processing while the material is being studied. Thus, the approach employed in this study combined the SQ3R approach of Robinson with the deep processing approach advocated by Schmeck. The resulting method will be called SPAR - Survey, Process Meaningfully, Ask Questions, Review. (The last step of this method, Review, incorporates Robinson's Reciting process, which he had designated as a separate step.)

Secondly, as mentioned, there is a need for studies of this type to address the characteristics of the students who will be receiving the intervention and to design treatments with these characteristics in mind. Although some preliminary efforts in this regard have appeared in the literature with respect to correlating improvement from study skills training with certain personality variables (e.g., Fretz et al., 1967; Seni et al., 1978) only one study has taken achievement level into account as well (Robyak & Downey, 1978). The results of this study were inconclusive with respect to personality - achievement level interactions since the authors used only one instrument to measure personality and also neglected to describe the nature of the procedures involved in training students in study skills. The present study will employ a variety of personality measures and two distinct achievement levels, one slightly below the class mean, and the other significantly below the class mean, and will examine the interaction between aptitude and the specific techniques comprising the SPAR method described above.

Specific Research Hypotheses

Specifically, the following hypotheses will be investigated:

1) The SPAR method is effective in improving students' scores above those of controls when studied in a laboratory setting.

2) There is a differential benefit of study skills training when subjects are tested via multiple choice and short answer tests.

3) The effects of training in the SPAR method will generalize beyond the laboratory to the classroom.

4) Certain of the techniques comprising the SPAR method (e.g. Asking Questions) are more effective than others in improving academic achievement.

5) Certain achievement variables (e.g. Reading level) are associated with greater benefit from training in the SPAR method.

6) Certain personality variables (e.g. Locus of Control) are associated with greater benefit from training in the SPAR method.

7) Interactions between certain personality and achievement variables (e.g. Final grade in Psychology 101 x Locus of Control) are associated with greater benefit as a result of training in the SPAR method.

8) There is a relationship between certain personality variables (e.g. need for social approval) and students' tendency to use SPAR even when not receiving course credit for doing so.

CHAPTER II

METHOD

Subjects. The subjects in this study were undergraduate students enrolled in an Introductory Psychology course at Loyola University of Chicago. At the time the study was begun there were 264 students registered for the course. As one of the requirements in the course students needed to obtain a certain number of research credits during the semester. There were two ways of fulfilling this requirement, either 1) participating in several psychology experiments, or 2) writing reports on articles they had read in psychological journals. The majority of students in the class opted for the former method.

Early in the semester, the experimenter went to the class and explained that she would be conducting an experiment at some point later in the semester which would enable the subjects who agreed to participate to obtain all their research credits for the course requirement. Students were told that approximately 100 students would be randomly chosen to participate from all those who expressed interest and that these students would be contacted by the experimenter about five weeks later. Finally, it was explained that part of the study required that the experimenter have access to the students' test grades in the course and a consent form giving permission for this was distributed. (A copy of this form is included in Appendix C). Students were encouraged to read the form, check the appropriate box indicating that they would or would not allow their grades to be seen, sign their name, campus address and phone number and return the form to the experimenter. Of 258 students who received the consent form, 245 (94.9%) agreed to allow their grades to be seen. The 13 remaining students were dropped from consideration for participation in the study.

In addition to gaining research credits, students in the Introductory Psychology course were required to take four one-hour examinations spaced about 3.5 weeks apart. Each of these examinations was a 50-item, 4-alternative multiple choice test and generally covered 3-4 chapters in the textbook. On the basis of their scores on the first of these tests, subjects were selected to participate in the present study, in the following manner. Test scores for all the students in the class were obtained from the instructor and *z*-scores for each student computed. Since subjects from two distinct achievement groups were desired for this study, one group slightly below the class mean, and the other considerably below the class mean, all students were selected whose *z*-scores on the first test fell either between 0.00 and -0.40 for the slightly below average group, or below -0.70 for the very low group. These cut-off scores were chosen somewhat arbitrarily in order both to insure that the two groups be distinct (i.e., no probable overlap between members) and to allow for sufficient numbers in each group. Selecting students in this manner yielded 50 students in the higher group and 53 in the lower group. Three students from this lower group were randomly dropped to equalize the numbers in the two groups. Thus, 50 students from the higher-achieving group and 50 from the lower-achieving group were finally selected to participate in the study.

When the grades on this first classroom examination were posted, an asterisk appeared beside the names of these 100 students directing their attention to a note posted below. The note reminded them of the experiment and instructed them to sign up for a time for their first appointment at a table located down the hall. Four days after the starred names were posted, 69 of the 100 students had signed up for a first appointment. At this point a list was made of the 31 students who had been selected but had not yet signed up. This list was given to the instructor of the course who read these students' names in class and passed around some additional sign-up sheets. Eighteen more students signed up at this time. The remaining 13 students were contacted by phone and asked if they were still interested in participating. Seven of these students agreed, most indicating that they were not aware that they had been selected. Four of the thirteen were unable to be reached despite repeated attempts, one of the thirteen had his phone disconnected and, therefore, was unable to be contacted and one student said he was no longer interested in participating and had decided to read journal articles instead to fulfill his research requirement. Thus, 94 of the 100 students selected actually participated in the experiment, 48 in the higher achievement group, and 46 in the lower achievement group.

Procedure. After the final list of 94 subjects was assembled, half of the subjects in each achievement level were randomly assigned to the experimental condition and half to the control condition. For the first session, the procedure for subjects in both conditions was identical. First, subjects were given a brief explanation of the purpose of the experiment, i.e., to gain an understanding of the different personality variables and study habits that characterized college students. Secondly, the general procedure of the experiment was explained. Subjects were told that they would be required to attend three more sessions in addition to this first one and that they would also be given some materials to work on at home and to return. They were also told that there would be one other phase to the experiment that they would learn about at a later date. The relationship between their meeting each of these requirements and their gaining their experimental credits for their psychology class was also explained. Subjects then were administered two of the eight personality tests employed in this study - the Tennessee Self-Concept Scale (Fitts, 1964) and the Survey of Study Habits and Attitudes (Brown & Holtzman, 1966). When these were completed, they were given a packet containing the other six tests - the Beck Depression Inventory (Beck, 1978), the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960), the Achievement Anxiety Test (Alpert & Haber, 1960), the Rotter I-E Scale (Rotter, 1966), the Bem Sex-Role Inventory (Bem, 1974) and the achievement and affiliation subscales of the Edwards' Personal Preference Schedule (Edwards, 1959). They were instructed to take these tests home, work on them alone and return them to the experimenter within approximately 72 hours. Finally, before leaving the session, all subjects signed up for a 50-minute time slot for the next session to be held about one week later. This session and all sessions in the experiment were conducted in groups of usually about 5 to 10 students each.

First Training Session - Experimental Condition

When subjects arrived for this session it was explained that they would be taught a study skills technique called the SPAR method which could help them improve their study habits and possibly their grades as well. They were told that, while they had been randomly selected to receive training in this method, other subjects in the study would not be receiving training and would be serving as controls. Thus, it was requested that they not reveal any of the information they received in the training sessions to anyone else in the class at least until the semester was over.

The four components of the SPAR method were then mentioned briefly and written on the blackboard. Bookmarks detailing the steps of the method in sequential order were distributed to the subjects for use during the session to follow along with the experimenter's explanation. Subjects were told that we would be covering the first two components, Surveying and Processing Meaningfully in this first session, the third component, Asking Questions, in the second session, and the final component, Reviewing, in the last training session. The procedure for signing up for each session and the credits they would earn for each were again reviewed. The total time for the session up to this point was about five minutes.

The next approximately five minutes were devoted to a definition and explanation of the technique of Surveying, which was compared to viewing the "Coming Attractions" in a movie theater before one actually goes to see the movie. A slide was then shown of a passage (from Johnson et al., 1982, p. 46) which made little sense unless one had some idea prior to reading the passage of what the topic was. Subjects were encouraged to read the passage and then asked if any of them could understand what the passage was about. None of the subjects in any of the training groups volunteered an answer. Then another slide was shown depicting the same passage on one side of the slide and a sketch of what was being described in the passage on the other side. Seeing this sketch made the previously unintelligible passage make sense and this fact was used to emphasize to the subjects the importance of Surveying a passage before reading it. Finally the goal of Surveying was reviewed and an opportunity provided for subjects to ask questions before moving on to the next component of the method.

For the next approximately ten minutes the second component of the SPAR method, Processing Meaningfully, was discussed. Subjects were told that while this step involved actually reading the passage, it also provided several techniques that would allow students to gain more meaning from what they were reading and, thus, to remember the material better when preparing for exams. Five such techniques were then discussed and an example provided for each via slides and audio tapes. These techniques were: (a) Associating the new material with something from one's own personal experience, (b) putting the new material into one's own words, (c) creating a mental image of what one is reading, (d) associating the new material with something already known, and (e) thinking of real-life applications for the new material. These strategies were derived from Schmeck et al.'s (1977) study of characteristics of deep processors. After the final technique had been presented and an example employing it discussed, students were advised that they need not use all five techniques each time they read, but should select the one or two that they found most relevant and helpful for them. Students were then presented with a slide of a short paragraph and were given about 2 minutes to read it and to decide which of the five techniques for meaningful processing they might use to remember it if they were studying it in preparation for an exam. After all subjects were finished reading, the experimenter asked for a volunteer to suggest which technique he or she might use to help remember the passage. Since the passage described rather graphically a fictional battle scene, all subjects who volunteered stated that they would use technique (c) above, creating a mental image of what they read.

Subjects were then told that the training phase of the session was finished and they would now have the opportunity to use the two components of SPAR that had been presented in the session to help them prepare for a test on a short passage they would be given to read. They were instructed to read the passage using both the Surveying and the Meaningful Processing techniques and were told that they would be given a test - part multiple choice and part short answer - on the contents of the passages. When they were finished reading they were told to bring the passage to the experimenter and she would give them the test questions. Three passages of approximately equal length were employed for this purpose. The passages dealt with topics of general interest and had been previously pilot-tested for equal difficulty. They were selected to resemble, in both topic and style of presentation, the type of passage typically encountered by a college student in an introductory course. One of the passages was titled, "Viruses," another was titled, "Winds of the World," and the third was titled "Peoples of Australia." Copies of each passage are included in Appendix A. One of the three passages was randomly distributed to each student and the time recorded on an answer sheet with the student's name on it. The order of the subjects' receipt of the passages was also randomized. This resulted in the following number of subjects receiving each passage on each trial: Trial 1: "Australia" passage - 17 trained subjects, 15 untrained; "Winds" passage - 14 trained subjects, 16 untrained; "Virus" passage - 15 trained subjects, 15 untrained; Trial 2: "Australia" passage - 13 trained, 17 untrained; "Winds" passage - 17 trained, 13 untrained; "Virus" passage - 15 trained, 15 untrained; Trial 3: "Australia" passage - 14 trained, 13 untrained; "Winds" passage - 14 trained, 16 untrained; "Virus" passage - 15 trained, 16 untrained.

When each student finished reading, he/she brought the passage and the bookmark with the steps in the SPAR method listed on it up to the experimenter, the time was recorded, and the student was given the test questions for that passage plus an answer sheet. When the test questions were completed the student turned them in and signed up for a time slot for the following session. This concluded the first training session. (N.B. Verbatim transcripts of each training session are included in Appendix B).

Second Training Session - Experimental Condition

The first five minutes of the second training session were spent reviewing the steps in the SPAR method discussed in the previous session - Surveying and Processing Meaningfully. Bookmarks detailing each of the steps were again distributed and students were encouraged to follow along as the experimenter defined each step briefly.

The next 15 minutes were spent discussing the third step in the SPAR method, Asking Questions to oneself about what one is reading. Students were told that some questions were more effective in helping them remember material than others and were then shown a slide of a short paragraph with four questions below it. The first of these questions was extremely broad in scope and was used to illustrate the fact that good questions should not be too general. The second question asked about one rather unimportant detail in the passage and was employed to illustrate the fact that good questions should likewise not be too specific. The third question asked about a fact not mentioned in the passage and was considered to be irrelevant to the main point of the passage. This question was used to show subjects that good questions should be relevant to the passage under study if they are to be helpful. The last question was judged by the experimenter to meet the criteria of being not overly broad nor overly specific and relevant to the passage and was therefore used as the model for a good question for the passage under discussion. Finally, the last quality of a good question that was emphasized to the subjects was that, as much as possible, it should be similar to the type of question typically asked by the professor teaching the course for which they were studying. Subjects were instructed to attempt to predict as best they could the questions the professor would ask and then ask these questions of themselves while preparing.

The next topic discussed was a brief overview of the principles of test construction designed to explain that, even though a few of the questions on most tests would be considered too specific according to the guidelines discussed above, these questions usually were necessary to discriminate good from poor students. Subjects were instructed that to attempt to anticipate even these very specific questions would probably not be realistic and they should instead attempt to follow the guidelines discussed above and, in the process, might tend to "pick up" some of the highly specific information anyway. A more specific rule of thumb that was suggested was to use the sub-headings in a chapter as a stimulus for a question on that section. For a section of text with the sub-heading, "Women's Suffrage - Effects on the Economy," for example, an appropriate question might be, "What were the effects of women's suffrage on the economy?".

The next task required the subjects to identify, on their own, appropriate and inappropriate questions. A short passage was distributed to each of the subjects and below it were five questions that subjects were told might have been made up by a student to test himself/herself on the material contained in the passage. Students were to read the passage and then, for each question, decide if it was too general, too specific, irrelevant or appropriate for that passage. They were told to record their responses on a line after each question and, when finished, hand in the sheet to the experimenter.

When subjects finished this task, the testing phase of the session was begun. Subjects were each given one of the three passages to read and were instructed to use all three of the components of the SPAR method that they had been taught up to that point in reading and preparing for the short test that would follow. They were given extra sheets on which to write their questions, the time was recorded and subjects began reading. When they were finished they returned the passages, their questions and the bookmarks to the experimenter. Time was again recorded and subjects were given the test for the particular paragraph they had read. When they finished answering all the questions they turned in the answer sheet and the questions, and signed up for a time slot for the following session. This concluded the second training session.

Third Training Session - Experimental Condition

As in the second training session, the first 5 minutes of the third training session were spent reviewing the components of the SPAR method taught previously. Bookmarks detailing the steps of the method were distributed and subjects followed along as each step was mentioned and defined briefly. An opportunity was then provided for subjects to raise questions about any of the previous steps.

The following 10 minutes of the session were spent discussing the final component of the SPAR method, Reviewing and Self-Testing. Reviewing was explained as the process of answering the questions the student has made up in the previous (Asking Questions) step. However, it was emphasized that in so doing the student must be attentive to the difference between a completely correct answer and a partially correct one. An example of this difference was given via a slide presentation of a paragraph and below it a question and the answer to it, both hypothetically made up by a student studying the passage. The question required a three-part response and the answer given included only two of them. This fact was pointed out to the students and the necessity of answering their questions, not only correctly, but completely was reaffirmed.

Students then were told that they would have the opportunity to test their skill at answering questions completely and correctly. The questions they had made up during the previous training session were redistributed along with the passages they had read and been tested on during that session. Subjects were told to find the answers to their questions in the passages and to write them out below the questions. They were allowed approximately seven minutes for this task.

When students finished this exercise they handed in the passages and their questions and answers. They were then told that when they were actually employing the SPAR method to prepare for exams, they should allow some time to elapse between making up the questions and attempting to answer them. It was suggested, for example, that in studying for a test, they should finish making up the questions one night and then the following night should go back and attempt to answer them.

Finally, the process of Self-Testing was described briefly. Students were encouraged, once they had finished making up and answering their questions, to put the answers away, along with all their textbooks, notes, etc. and try to answer the questions simply by memory. In doing so they should check each of their answers with the correct one and repeat this procedure until all of their questions could be answered correctly from memory.

Next, they were told that the last phase of the experiment involved their using the SPAR method to help them prepare for an upcoming exam (their third) in their Introductory Psychology class. This exam would cover three chapters in their textbook and subjects were encouraged to use the method on each of these chapters. However, in order to receive their last research credit, they needed to submit to the experimenter the questions they made up (and their answers) for only one of the three chapters. In addition, they needed to complete a schedule of the total amount of time they had spent studying for the third exam and the particular methods they used to help them study. The experimenter explained that she would be present in class on the day of the third exam to collect these materials from the subjects. A sheet explaining these requirements was distributed to the subjects for their reference while preparing for the test. They were also informed that they could keep the bookmarks they had been using in the sessions to remind them of the steps in the SPAR method.

The final 30 minutes of the session were devoted to the testing phase. Subjects were encouraged to use all four steps in the SPAR method to study the passage they would be given, including making up and answering questions. The procedure was the same in this session as in the previous two in that the third of the three passages was distributed to each subject along with extra sheets on which to write their questions and answers and the time recorded. When they were finished reading time was recorded again and the subjects turned in the passages, their questions and answers and received the test questions for the passage they had read. When all the subjects completed the test the third training session was concluded.

Control Condition

After the first general overview and testing session which was identical for both experimental and control groups, the control subjects also came for three subsequent 50-minute sessions, each 5-7 days apart. These subjects did not receive training in the SPAR method, however, but instead received a variety of tasks designed to measure various aspects of their academic achievement. During the first control session, for example, subjects received a reading comprehension test constructed by Educational Testing Service (1978). The average amount of time necessary to complete this test corresponded approximately to the 20 minutes spent presenting the first two components of the SPAR method in training Session 1 to the subjects in the experimental condition.

In the second control session subjects received a 20-item, 4-alternative multiple choice vocabulary test using words taken from their Introductory Psychology textbook. (A copy of this test is included in Appendix D). This test also took approximately 20 minutes for subjects to complete, roughly the amount of time spent describing the Asking Questions component of the SPAR method to the subjects in the experimental condition in training Session 2.

In the third control session subjects received a 30-item spelling test, again made up of words taken solely from their psychology textbook. The words were presented to the subjects on audio tapes where each word was said once, used in a sentence, then repeated. A list of the words used in this test is included in Appendix D. Approximately 30 seconds elapsed between the presentation of consecutive items on this test, which resulted in the total time for the test being about 15 minutes. This also corresponded to the amount of time spent describing the Reviewing and Self-Testing component of the SPAR method to the subjects in the experimental condition in training Session 3. Also during the third control session subjects were given a sheet on which they were to record the amount of time spent studying for the upcoming third test and return it to the experimenter along with a list of the methods they used to help them study. They, like the experimental subjects, were told that the experimenter would be present in class on the day of the third exam to collect these materials from students who had been subjects in the experiment. In addition, they were told that they would receive their final research credit for participating in the study when they handed in these completed schedules of study time and lists of study methods.

In addition to the tasks described above, each control session also included a testing phase similar to that described for the experimental subjects, in which control subjects were given one of the three passages to read (the order for each subject randomly selected), were timed during the period they spent reading it and then were given a brief test, part multiple choice, part short answer, on the passage they had read. The passages and tests received were identical for the experimental and control groups.

Final Exam

Approximately two weeks after this third exam and about 1-1/2 weeks prior to the final exam in the Introductory Psychology class a letter was mailed to all the students in the experimental condition. (A copy of the letter is included in Appendix C). The letter reminded students of their participation in the experiment and suggested that they use the SPAR method to help them study for the final exam as they had for the third exam, even though they could receive no additional credits for doing so as they had for the previous test. The letter requested that if students did decide to use the SPAR method to prepare for the final that they hand in to the experimenter the questions and their answers that they made up during the Asking Questions component of the model as they had for the third exam. A specific location was indicated for subjects to drop off their questions in this event.

CHAPTER III

RESULTS

Subject Characteristics

Table 1 lists the means and standard deviations for each of the three achievement-type tests taken by the higher- and lower-achieving Control subjects during their three laboratory sessions. Two subjects, one in each achievement level, were dropped from these analyses because of difficulty they had using the English language (i.e., they were foreign students). This fact was discovered when it was observed that these two students obtained scores of 0 of 30 words correct on the spelling test, 10 fewer correct than the next lowest-scoring student. The two students were then contacted and indicated that they were not primarily English-speaking and had been in the U.S. less than four months. Since subjects were randomly assigned to either Experimental or Control conditions, it is reasonable to assume that the scores summarized in Table 1 are a representative sample of the achievement scores in these three areas for all the subjects in the study. Significant differences between the two achievement levels were found in the Vocabulary test (Higher Level: $\bar{X} = 13.40$; Lower Level: $\bar{X} = 11.30$; $t(40) = 2.43$, $p < .02$), the Drawing Inferences subscale of the Reading Comprehension test (Higher: $\bar{X} = 12.95$; Lower: $\bar{X} = 10.40$, $t(40) = 2.92$, $p < .01$), and the total score of the Reading Comprehension test (Higher: $\bar{X} = 35.15$;

Table 1

Means and Standard Deviations for Each Achievement-Type Test Taken by Higher- and Lower-Achieving Control Subjects

Achievement Level		Type of Test					
		Spel.[a]	Voc.[b]	RC-1[c]	RC-2[d]	RC-3[e]	RC-T[f]
Higher	$\bar{x}$	24.85	13.40**	11.25	10.95	12.95***	35.15*
	SD	6.47	2.62	2.10	1.19	2.33	4.51
Lower	$\bar{x}$	21.70	11.30**	10.20	10.30	10.40***	30.90*
	SD	8.75	3.15	2.63	2.32	3.44	7.27
Total	$\bar{x}$	23.28	12.35	10.72	10.62	11.68	33.02
	SD	7.76	3.05	2.41	1.85	3.17	6.35

[a]Spelling (40 possible). [b]Vocabulary (20 possible). [c]Reading Comprehension-Scale 1 - Understanding Main Ideas (13 possible). [d]Reading Comprehension-Scale 2 - Understanding Direct Statements (13 possible). [e]Reading Comprehension-Scale 3 - Drawing Inferences (17 possible). [f]Reading Comprehension - Total (43 possible).

* These means differ significantly at $p < .05$.
** These means differ significantly at $p < .02$.
***These means differ significantly at $p < .01$.

Lower: $\bar{X}$ = 30.90; $t(40) = 2.30$, $p < .05$). Inspection of the means in Table 1 reveals that the higher achievement group obtained higher scores on each of the tests, although only those three mentioned above reached significance.

Lab Task

As mentioned in the Method section, all students in the study were required to attend three sessions in addition to the first testing and general information session. If subjects missed two consecutive scheduled appointments for any of these sessions without calling to cancel their appointment they were dropped from the study. Of the 47 students in the experimental condition, 3 fell into this category, 1 higher-achievement subject and two lower-achievement subjects. Of the 47 control subjects, One (higher achievement) missed 2 consecutive appointments and was also dropped. In addition, one experimental subject in the lower group withdrew from the course after the second examination. This student was also dropped from all analyses. Scores were then computed for all students who successfully completed all three training or control sessions and who remained in the course for the entire semester. This resulted in a total of 43 subjects in the experimental group and 46 subjects in the control group. Three students were then randomly dropped from the control group in order to perform the statistical analyses described below. This yielded 43 students in the experimental group (22 higher-achieving and 21 lower-achieving students) and 43 in the control group (21 higher-achieving and 22 lower-achieving students) on whose scores the following results are based.

The means and standard deviations for the three trials (sessions) in the laboratory task of this study are presented for the training group and the no training group in Table 2. These scores refer to the total number correct for each group on both the multiple choice and the short answer sections of the test. Predictions that the training group would score significantly higher on this task were not supported as there was no significant main effect for training in this analysis (Training: $\bar{X} = 13.90$, No Training: $\bar{X} = 13.67$, $F(1,84) < 1.0$). In addition, although both groups appeared to score somewhat higher on their final trial, no significant trials effect was found (Trial 1: $\bar{X} = 13.58$; Trial 2: $\bar{X} = 13.55$; Trial 3: $\bar{X} = 14.22$, $F(2,168) = 1.39$, NS). The Trials x Training interaction was also nonsignificant (Training: Trial 1: $\bar{X} = 13.76$, Trial 2: $\bar{X} = 13.23$, Trial 3: $\bar{X} = 14.70$; No Training: Trial 1: $\bar{X} = 13.40$, Trial 2: $\bar{X} = 13.86$, Trial 3: $\bar{X} = 13.74$; $F(2,168) = 1.57$, NS).

In looking at the two components of the laboratory task (multiple choice and short answer), it is apparent that the results for each are different. These results are presented in Table 3. For the multiple choice task, no significant main effects or interactions were found (Training: $F(1,84) = 0.09$, NS; Trials: $F(2,168) = 0.54$, NS; Training x Trials: $F(2,168) = 0.88$, NS). In the short answer task, however, a significant main effect for Trials was revealed (Trial 1: $\bar{X} = 6.76$, Trial 2: $\bar{X} = 6.50$, Trial 3: $\bar{X} = 7.40$, $F(2,168) = 3.44$, $p < .05$), as well as a nearly significant Trials x Training interaction (Training: Trial 1: $\bar{X} = 7.16$, Trial 2: $\bar{X} = 6.23$, Trial 3: $\bar{X} = 7.77$; No Training: Trial 1: $\bar{X} = 6.35$, Trial 2: $\bar{X} = 6.77$, Trial 3: $\bar{X} = 7.02$, $F(2,168) = 2.33$, $p < .10$). The results from this analysis are illustrated in the graph in Figure 1.

Table 2

Total Number Correct on Each Trial of
Laboratory Task for Trained
and Untrained Subjects

Group		Trials 1	2	3
Trained	$\bar{x}$	13.76	13.23	14.70
	SD	5.25	3.78	4.23
Untrained	$\bar{x}$	13.40	13.86	13.74
	SD	5.25	3.72	4.85

Note. Maximum score per trial = 25.

Table 3

Mean Scores for Trained and Untrained Subjects on Multiple Choice and Short Answer Sections of Laboratory Test

		Type of Task					
		Multiple Choice[a]			Short Answer[b*]		
		Trial			Trial		
Group		1	2	3	1	2	3
Trained	$\bar{x}$	6.60	7.00	6.93	7.16	6.23	7.77
	SD	2.28	1.91	1.87	3.59	2.70	3.27
Untrained	$\bar{x}$	7.04	7.09	6.72	6.35	6.77	7.02
	SD	2.47	2.07	2.15	3.52	2.55	3.28
Total	$\bar{x}$	6.83	7.05	6.83	6.76	6.50	7.40
	SD	2.37	1.98	2.01	3.52	2.55	3.28

[a]Total possible = 10. [b]Total possible = 15.

*Significant effects for Short Answer Task only: Trials: $p < .05$.
Trials x Group: $p < .10$.

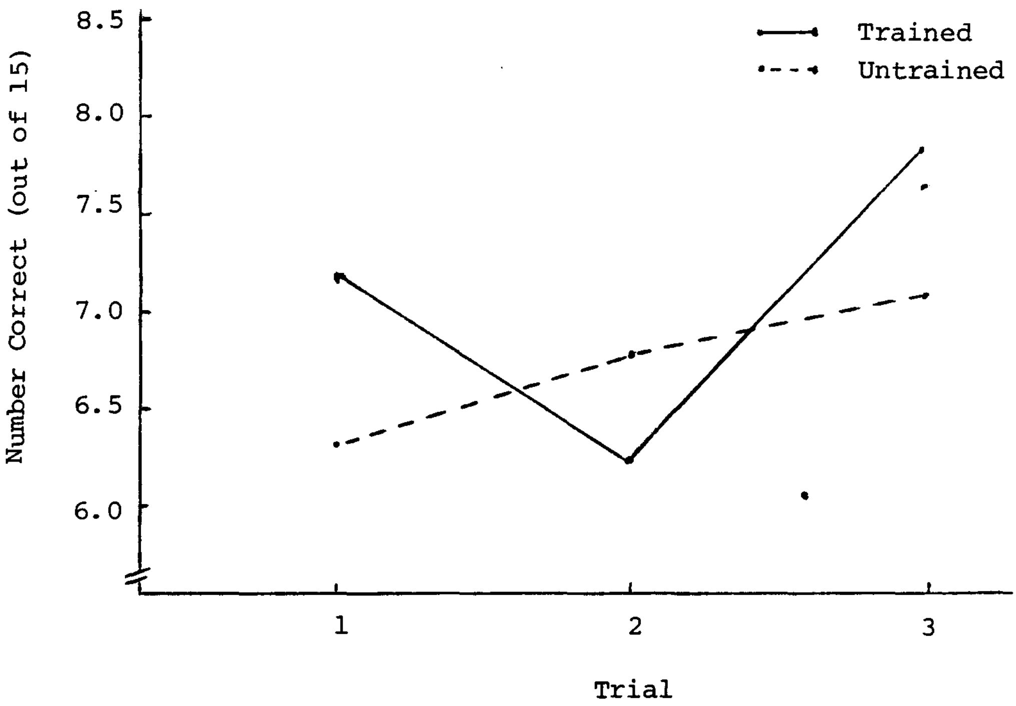

Figure 1. Mean Number Correct for Each Trial of Short Answer Subtask of Lab Test for Trained (n=43) and Untrained (n=43) Subjects.

From this graph it appears that the training group had generally higher scores than the controls on both the first and third trials, but dipped below the controls on the second trial. A post-hoc Newman-Keuls analysis performed on these means revealed the mean for the training group on Trial 2 ($\bar{X}$ = 6.23) to be significantly different from the mean for the training group on Trial 3 ($\bar{X}$ = 7.77) ($\underline{q}$ = 66.0, $\underline{p} < .05$), but indicated no other significant differences among the six means.

Table 4 illustrates the results of the laboratory task overall for each of the two achievement groups collapsed across training levels. A significant main effect for Achievement Level was revealed (Higher: $\bar{X}$ = 15.09, Lower: $\bar{X}$ = 12.47, $\underline{F}(1,84) = 11.66$, $\underline{p} < .01$), but no significant effects for either Trials ($\underline{F}(2,168) = 1.52$, NS) or for the Achievement Level x Trials interaction ($\underline{F}(2,168) = 0.01$, NS). Newman-Keuls analysis done post-hoc revealed that each of the three means for the higher achievement level were significantly different from the means for both Trial 1 ($\bar{X}$ = 12.16) and Trial 2 ($\bar{X}$ = 12.37) of the lower achievement level, and that the mean for Trial 3 of the higher group ($\bar{X}$ = 15.59) was significantly different from the mean for Trial 3 of the lower group ($\bar{X}$ = 12.88).

Analysis of the two sub-tasks of the laboratory test revealed similar results. Table 5 illustrates the results of the Multiple Choice and Short Answer sections for the two achievement levels collapsed over training groups. In both of these tasks a significant main effect for achievement level was found (Multiple Choice: Higher: $\bar{X}$ = 7.36, Lower: $\bar{X}$ = 6.19, $\underline{F}(1,84) = 11.42$, $\underline{p} < .01$; Short Answer: Higher: $\bar{X}$ = 7.73, Lower: $\bar{X}$ = 6.08, $\underline{F}(1,84) = 8.70$), $\underline{p} < .01$). In neither of these two

Table 4

Total Scores on Laboratory Task for Each Achievement Level Collapsed Over Training Group

Achievement Level		Trial 1	Trial 2	Trial 3	Total
Higher	$\bar{X}$	14.93	14.77	15.59	15.09*
	SD	3.86	3.51	4.07	4.14
Lower	$\bar{X}$	12.16	12.37	12.88	12.47*
	SD	5.49	4.84	4.58	4.95

Note. Maximum possible score = 25.

*Significant main effect for Achievement Level: $p < .01$.

Table 5

Mean Scores for Higher- and Lower-Achieving Subjects on Multiple Choice and Short Answer Sections of Laboratory Test

		Type of Task					
		Multiple Choice[a*]			Short Answer[b**]		
		Trial			Trial		
Achievement Level		1	2	3	1	2	3
Higher	$\bar{x}$	7.40	7.47	7.21	7.53	7.30	8.35
	SD	2.15	1.45	1.99	3.36	2.70	2.79
Lower	$\bar{x}$	6.26	6.49	6.42	5.91	5.88	6.47
	SD	2.48	2.33	1.93	3.70	3.19	3.48
Total	$\bar{x}$	6.83	6.98	6.81	6.72	6.59	7.41
	SD	2.38	1.99	1.99	3.61	3.04	3.28

[a]Total possible = 10. [b]Total possible = 15.

* Significant main effect on Multiple Choice task:
Achievement Level, $p < .01$.

**Significant main effects on Short Answer task:
Achievement Level, $p < .01$
Trials, $p < .10$.

sub-tasks was a statistically significant trials effect found, although the trials effect for Short Answers was nearly so (Trial 1: $\bar{X}$ = 6.72, Trial 2: $\bar{X}$ = 6.59, Trial 3: $\bar{X}$ = 7.41, $F(2,168) = 2.93$, $p < .10$). Nor were the Trials x Achievement Level interactions significant in either case.

In order to examine the effects of training within each achievement level, further analyses of variance were performed, separating the subjects into the two achievement levels. Table 6 lists the results of these analyses for the lower achievement group. No significant main effects or interactions were found for this lower group. Results for the higher achievement group, however, summarized in Table 7, indicate a nearly significant Trials x Training interaction for the total score on the laboratory task (Training: Trial 1: $\bar{X}$ = 15.50, Trial 2: $\bar{X}$ = 13.95, Trial 3: $\bar{X}$ = 16.14; No Training: Trial 1: $\bar{X}$ = 14.05, Trial 2: $\bar{X}$ = 15.05, Trial 3: $\bar{X}$ = 14.55; $F(2,84) = 3.07$, $p < .10$), as well as a significant main effect for Trials on the Short Answer sub-task (Trial 1: $\bar{X}$ = 7.45, Trial 2: $\bar{X}$ = 7.02, Trial 3: $\bar{X}$ = 8.18, $F(2,84) = 3.39$, $p < .05$) and a significant Trials x Training interaction, also on the Short Answer task (Training: Trial 1: $\bar{X}$ = 8.55, Trial 2: $\bar{X}$ = 6.77, Trial 3: $\bar{X}$ = 8.86; No Training: Trial 1: $\bar{X}$ = 6.36, Trial 2: $\bar{X}$ = 7.27, Trial 3: $\bar{X}$ = 7.50, $F(2,84) = 4.67$, $p < .05$). Number correct are graphed in Figure 2. Post-hoc Newman-Keuls analyses performed on the six group means revealed that the Trial 3 mean for the Training group ($\bar{X}$ = 8.86) was significantly different from the Trial 2 mean for the same group ($\bar{X}$ = 6.77) and from the Trial 1 mean for the No Training group ($\bar{X}$ = 6.36). No other differences among the six means were found to be significant. Thus, in

Table 6

Mean Number Correct for Lower-Achieving Trained and Untrained Subjects on Laboratory Task

		Type of Task								
		Multiple Choice[a]			Short Answer[b]			Total Score[c]		
		Trial			Trial			Trial		
Group		1	2	3	1	2	3	1	2	3
Trained	$\bar{X}$	6.19	6.62	6.57	5.81	5.81	6.62	12.00	12.43	13.19
	SD	2.29	2.44	1.66	3.36	3.11	3.41	4.98	4.46	4.33
Untrained	$\bar{X}$	6.29	6.10	6.33	6.29	6.05	6.38	12.57	12.14	12.71
	SD	3.02	2.36	2.22	4.06	3.44	3.69	6.39	5.34	4.98
Total	$\bar{X}$	6.24	6.36	6.45	6.05	5.93	6.50	12.28	12.28	12.95
	SD	2.65	2.39	1.94	3.69	3.24	3.51	5.67	4.86	3.60

[a]Total possible = 10. [b]Total possible = 15. [c]Total possible = 25.

Table 7

Mean Number Correct for Higher-Achieving Trained and Untrained Subjects on Laboratory Task

Group		Multiple Choice[a]			Short Answer[b*]			Total Score[c**]		
		Trial			Trial			Trial		
		1	2	3	1	2	3	1	2	3
Trained	$\bar{X}$	6.95	7.18	7.27	8.55	6.77	8.86	15.50	13.95	16.14
	SD	2.55	1.44	2.03	3.29	2.22	2.78	5.33	2.89	3.67
Untrained	$\bar{X}$	7.68	7.77	7.04	6.36	7.27	7.50	14.05	15.05	14.55
	SD	1.62	1.41	2.08	3.11	3.19	2.77	4.18	3.81	4.57
Total	$\bar{X}$	7.32	7.48	7.16	7.45	7.02	8.18	14.77	14.50	15.34
	SD	2.14	1.44	2.03	3.35	2.73	2.83	4.79	3.39	4.18

[a]Total possible = 10. [b]Total possible = 15. [c]Total possible = 25.

* Significant effects on Short Answer Task: Trials, $p < .05$
Trials x Group, $p < .05$

**Significant effect on Total Score: Trials x Group, $p < .10$

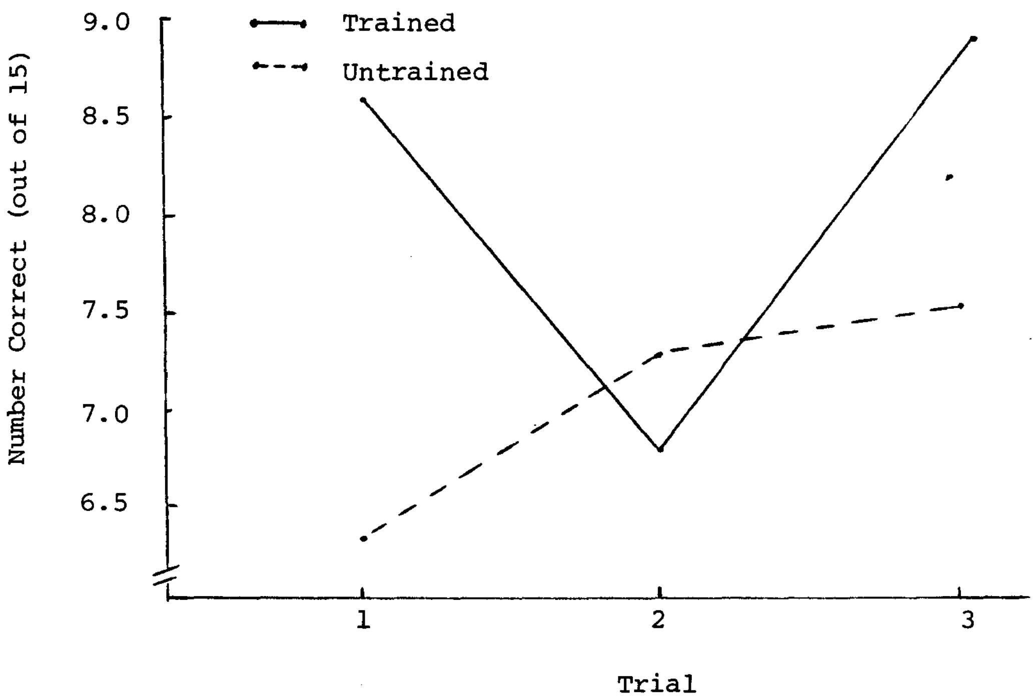

Figure 2. Mean Number Correct for Each Trial of Short Answer Subtask of Lab Test for Higher-Achieving Trained (n=22) and Untrained (n=22) Subjects.

this analysis, as in the one illustrated in Figure 1, the training group appeared to demonstrate a sizeable drop in number correct on Trial 2, and then to "bounce back" on Trial 3 to their previously high level. It is noted, however, that this effect occurred only on the Short Answer section of the laboratory task and was not demonstrated in the Multiple Choice section. A graph illustrating the responses of the higher-achieving students to both the Short Answer and the Multiple Choice sections of the lab task is presented in Figure 3. Moreover, the effect appeared to apply only to the higher achievement group and was not observed in the analysis of the lower group illustrated in Table 6.

One hypothesis for the lack of overall training effect observed in the laboratory task was that the passages subjects read may not have been of equal difficulty. Since the subjects received different passages on each trial, more difficult passages in later trials may have obscured a training effect. A simple analysis of variance was performed to test this hypothesis. The results are presented in Table 8. Contrary to the results of pilot testing on the passages, a main effect was found indicating a difference among the three passages in the total number correct ($\underline{F}(2,267) = 8.12$, $\underline{p} < .01$). A post-hoc Newman-Keuls analysis indicated that the "Winds" passage ($\overline{X} = 12.07$) was significantly more difficult than either the "Virus" passage ($\overline{X} = 14.60$) or the "Australia" passage ($\overline{X} = 14.03$), which did not differ significantly from one another.

Since there was a difference in difficulty level of the passages, this may have led to differences in the difficulty level of a particular order of passages. Receiving a relatively difficult passage first, for example, may have influenced a student's motivation to learn the

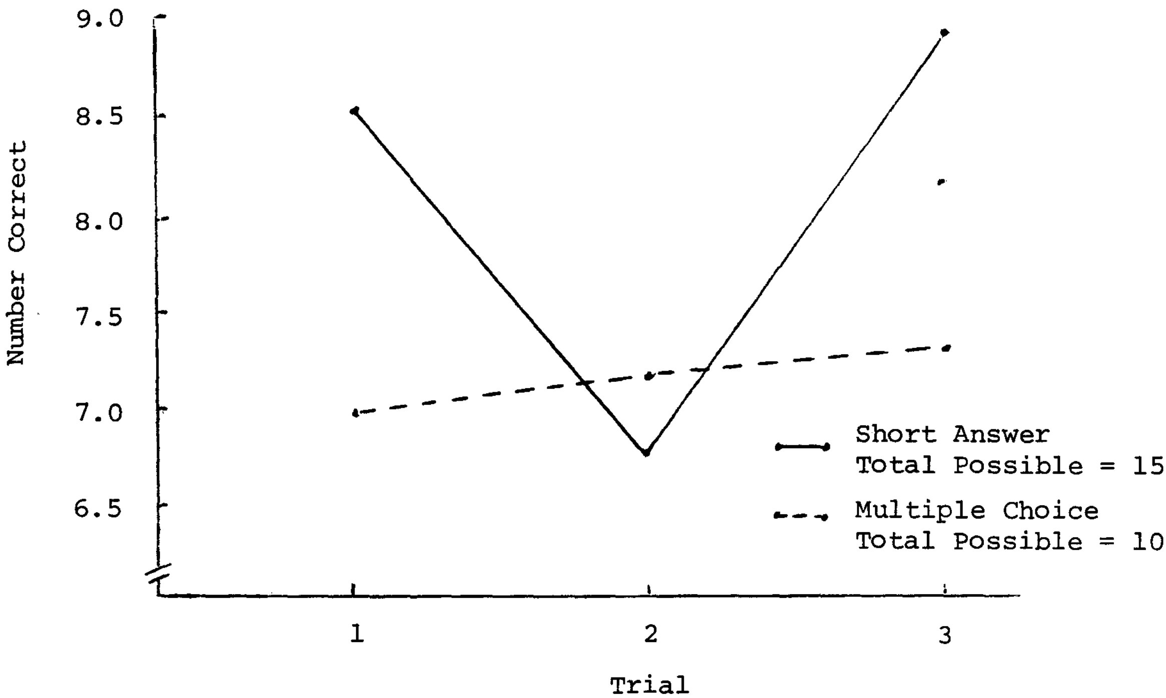

Figure 3. Mean Number Correct for Each Trial of Short Answer Subtask of Lab Test for Higher-Achieving Trained (n=22) Subjects.

Table 8

Mean Number Correct for All Subjects on Each of the Three Lab Test Passages

	Passage			
	"Virus"	"Winds"	"Australia"	Total
$\bar{X}$	14.60_1	12.07_2	14.03_1	13.57
SD	4.67	3.47	4.58	4.70

Note. Total possible = 25. Means with different subscripts are significantly different at $p < .01$.

SPAR method differently than receiving an easier passage first. Although subjects were assigned to orders randomly, it could have occurred simply by chance that more training subjects received difficult orders, thereby making it difficult to identify a training effect when compared with controls. The mean number correct for each order (total number correct across three trials) is presented in Table 9. Although some variation can be seen among the mean total correct for each order, this variation was not statistically significant ($F(5,66) < 1.0$). Thus, although one of the three passages did prove to be significantly more difficult than the other two, this difference did not appear to affect the overall difficulty of any of the six orders of presentation. The hypothesis that subjects in the training group received more difficult orders was therefore not supported.

However, even though no particular order of passages was any more difficult than any other order, it could still have occurred that at any one trial, one group may have received more difficult passages than the other. For example, the drop in total number correct on Trial 2 observed for the Training group could have been due to more subjects in this group having received the "Winds" passage at this trial than in the No Training group. The number of subjects receiving the "Winds" passage in the Training versus the No Training group for each trial is illustrated in Table 10. A chi square analysis performed on these frequencies did not yield significant results ($X^2(5, N = 86) = .82$, NS). Thus, the hypothesis that more subjects in the Training group than in the No Training group received a difficult passage at any one trial was not supported.

Another hypothesis for the lack of a training effect observed in

Table 9

Mean Number Correct for All Subjects on Each of Six Orders of Passages Used in Lab Task

	Order					
	AWV	WVA	VAW	VWA	AWV	WAV
$\bar{X}$	42.67	38.08	42.50	42.83	43.08	38.92
SD	11.70	14.29	6.52	8.39	7.10	13.61

Note. A = "Australia," W = "Winds," V = "Virus." Total possible score = 75.

Table 10

Number of Subjects in Trained and Untrained Groups Receiving "Winds" Passage on Each Trial of Lab Task

	Trial		
Group	1	2	3
Trained	14	16	13
Untrained	15	13	15

previous analyses is that, although the subjects in the training condition were presented with the SPAR method and encouraged to use it while reading the training passages, they may perhaps have found it too difficult or too much trouble to use and, therefore, did not use it in the laboratory task. One way to address this question is to examine the amount of time spent reading the passages by subjects in the training and no training conditions. If, as hypothesized, subjects in the training condition were not actually using the SPAR method, one would expect no difference in the amount of time spent by these subjects and those in the control condition. Additionally, since subjects in the training condition were being taught one step in the SPAR method at each training session and were encouraged to use it plus all the previous steps they were taught, one would expect that if subjects were actually using the method, the time spent should increase with each session as they incorporated the new step taught. If, on the other hand, subjects were not using the method, no sequential increase in time spent should be obtained.

Table 11 illustrates the results of this analysis. Contrary to the predictions of the above hypothesis, subjects in the training condition did spend significantly more time reading their passages than did the control subjects (Training: $\bar{X}$ = 19.40; No Training: $\bar{X}$ = 14.94; $\underline{F}(1,82) = 22.23$, $\underline{p} < .01$). Additionally, a main effect for Trials was observed (Trial 1: $\bar{X}$ = 14.21, Trial 2: $\bar{X}$ = 16.31, Trial 3: $\bar{X}$ = 21.07; $\underline{F}(2,164) = 61.68$, $\underline{p} < .01$), and Newman-Keuls analysis indicated that trained subjects spent significantly more time on Trials 2 and 3 than they did on Trial 1. Finally, a significant Trials x Training interaction was found (Training: Trial 1: $\bar{X}$ = 14.05, Trial 2: $\bar{X}$ = 17.52,

Table 11

Number of Minutes Spent Reading Passages
in Each Trial of Lab Task by
Trained and Untrained Subjects

Group		Trial 1	Trial 2	Trial 3	Total
Trained	$\bar{X}$	14.05	17.52	26.64	19.40
	SD	3.62	4.60	7.92	7.76
Untrained	$\bar{X}$	14.21	15.09	15.50	14.94
	SD	5.12	6.11	4.59	5.30
Total	$\bar{X}$	14.13	16.31	21.07	
	SD	4.41	5.51	8.54	

Note. The following significant effects were found with all p-values $< .01$: Trials: $F(1,82) = 22.23$; Group: $F(2,164) = 61.68$; Trials x Group: $F(2,164) = 42.95$.

Trial 3: $\bar{X}$ = 26.64; No Training: Trial 1: $\bar{X}$ = 14.21, Trial 2: $\bar{X}$ = 15.09, Trial 3: $\bar{X}$ = 15.50; $F(2,164) = 42.95$, $p < .001$). The mean times spent for the trained versus the untrained subjects are graphed in Figure 4. Similar results were found for both levels when time spent was analyzed for each achievement level separately. These results fail to support the hypothesis that trained subjects were not employing the SPAR method in reading their passages during the laboratory task.

Third Class Exam

As mentioned above, all subjects in the study were required to submit to the experimenter an estimate of the amount of time they had spent studying for the third classroom examination as well as a list of the methods they used to help them study. The number of hours reported by the Trained versus the Untrained subjects is illustrated in Table 12. No significant difference was found between these two groups of reported times (Training: $\bar{X}$ = 11.00, No Training: $\bar{X}$ = 10.48; $t(70) = 0.30$, NS).

In addition, subjects who had received training were requested to submit, as evidence of their having used the SPAR method, a copy of the questions they made up during the third step (Asking Questions) of the method. Of the 43 students who completed the three training sessions, only four failed to submit questions, three from the lower group and one from the higher group. Since there was no way of insuring that these students had actually used the SPAR method to study for Test 3, their scores were dropped from the analyses of data from Exam 3. In addition, there were three students in the control group (all low-achieving) and one in the experimental group (also low-achieving) who did not take

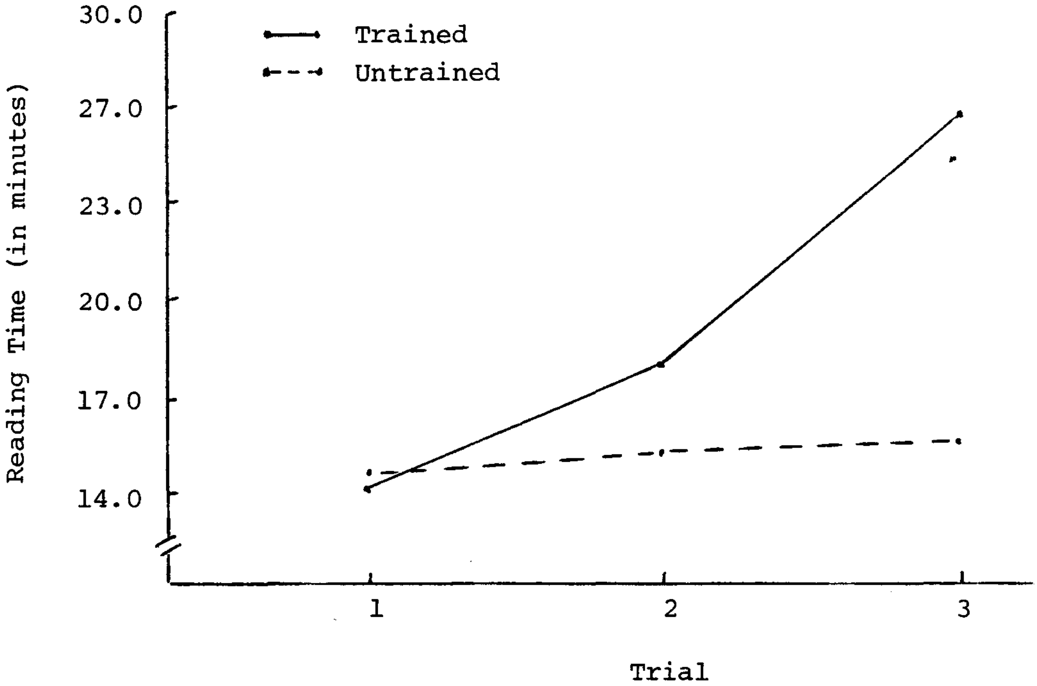

Figure 4. Number of Minutes Spent Reading Passages in Each Trial of Lab Task by Trained (n=45) and Untrained (n=45) Subjects.

Table 12

Mean Number of Hours Spent Preparing for Test 3 for Trained and Untrained Subjects

	Group	
	Trained	Untrained
$\bar{X}$	11.00	10.48
SD	6.92	8.50

Test 3 with the class and took a different make-up examination at a later date. These students' scores were also dropped from the analyses. Finally, there were two students in the experimental group (both higher-achieving) and one in the control group (lower-achieving) who did not take the second examination with the class and took a different make-up exam at a later date. Since the mean of the students' scores on the first two tests was used as the pre-treatment measure in the analyses to be described below, to include these students' scores in the analyses of the class examination data would not have been appropriate. These three subjects, thus, were also dropped from these analyses. This yielded 36 experimental subjects and 39 control subjects. Three subjects were randomly dropped from the latter group to equalize the number in each group. Therefore, the analyses of the subjects' scores on the third classroom examination were based on the scores of the 36 experimental students and 36 control students who completed all three training sessions, took all tests with the class and handed in their questions and related materials at the appropriate time. The mean number of questions turned in by each of the two achievement groups is indicated in Table 13. No difference was revealed between the number of questions made up by the higher and lower achievement groups (Higher: $\bar{X}$ = 19.05, Lower: $\bar{X}$ = 20.56; $\underline{t}(34) = 1.70$, $\underline{p} > .05$).

The means and standard deviations of the third class exam for both trained and untrained subjects are presented in Table 14. Although both groups significantly improved their scores on this test from the average of their two previous exams ((T1 + T2)/2: $\bar{X}$ = 29.39, T3: $\bar{X}$ = 30.22, $\underline{F}(1,70) = 5.79$, $\underline{p} < .05$), the trained subjects did not improve to a

Table 13

Mean Number of Questions Turned In
By Trained Students in
Each Achievement Level

	Achievement Level	
	Higher	Lower
$\overline{X}$	19.05	20.56
SD	4.84	4.92

Table 14

Mean Scores on $\frac{\text{Test 1 + Test 2}}{2}$ and Test 3

for Trained and Untrained Subjects

Group		Test: $\frac{\text{Test 1 + Test 2}}{2}$	Test: Test 3
Trained	$\bar{x}$	29.12	30.22
	SD	4.23	5.06
Untrained	$\bar{x}$	29.65	31.61
	SD	5.38	7.13
Total	$\bar{x}$	29.39	30.92
	SD	4.81	6.18

Note. Total possible = 50. Significant main effect for Tests, $p < .05$.

greater degree and, in fact, did slightly less well as a group on this test than did the students who received no training (Training: T3: $\bar{X}$ = 30.22, No Training: T3: $\bar{X}$ = 31.61). Correlation coefficients computed between amount of time reportedly spent in preparation for Test 3 and resultant score on the test are illustrated in Table 15. Significant correlations were found for Untrained subjects ($r = .31$, $p < .05$) and for Lower-Achieving subjects ($r = .37$, $p < .05$).

Separating the groups into the two achievement levels reveals the results presented in Table 16. Neither the higher- nor the lower-achieving students who received training scored significantly better on this test than did their untrained counterparts, although the effects for each group were somewhat different. For the lower group, while the trained students significantly improved their performance on the first two exams, the untrained students in this achievement group also improved, resulting in no significant differential improvement for the students receiving training. The fact that both groups in this achievement level improved their scores on this exam could be explained by regression toward the mean. For the higher-achieving students, on the other hand, neither the trained nor the untrained group scored significantly better on the third test than they had on the previous two. Thus, it would appear that while the training had no significant effect on each group's exam performance relative to its control group, it did affect the trained students in each of the achievement groups in a somewhat different way. This was supported by an analysis of the test scores of the higher-achieving versus the lower-achieving trained students. In addition to a significant main effect for achievement level (Higher: $\bar{X}$ = 31.22, Lower:

Table 15

Correlation Coefficients Between Number of Minutes Spent Studying for Test 3 and Score on the Test for Trained and Untrained and Higher- and Lower-Achieving Subjects

	Group			
	Trained	Untrained	Higher	Lower
r	.16	.31*	.14	.37*

*$p < .05$

Table 16

Mean Scores on $\frac{T1 + T2}{2}$ and Test 3 for Higher- and Lower-Achieving Trained and Untrained Subjects

Group		Test: $\frac{T1 + T2}{2}$	Test: Test 3
Trained:			
Higher-Achieving	$\bar{X}$	31.92	31.35
	SD	2.28	4.44
Lower-Achieving	$\bar{X}$	25.62	28.81
	SD	3.40	5.56
Untrained:			
Higher-Achieving	$\bar{X}$	32.12	33.75
	SD	2.72	5.78
Lower-Achieving	$\bar{X}$	26.38	28.00
	SD	5.50	6.59

Note. Total possible score = 50. Significant main effect for Tests found for Lower Achievement Group, $p < .05$.

$\bar{X}$ = 27.22, $F(1,30) = 12.02$, $p < .01$), a significant Trials x Achievement Level interaction was observed ($F(1,30) = 5.94$, $p < .05$). These results are presented in Table 17 and graphed in Figure 5.

In attempting to explain this lack of training effect, one hypothesis that was investigated was that, although subjects were assigned randomly to either the experimental or the control group, control subjects by chance may have had higher scores on their first two exams than did the experimental subjects. Support for this hypothesis was found in examining the mean scores for trained and untrained subjects on their first two tests, as shown in Table 14. An analysis of Test 3 scores in which subjects in the experimental and control groups were matched on their pre-test (T1 + T2)/2 scores was conducted to address this issue.

The means and standard deviations for the Test 3 scores of the trained and untrained subjects matched on the pre-test are shown in Table 18. Matching on the pre-test did not appear to change the lack of training effect observed in previous analyses, but it did eliminate the main effect for trials found in the analysis presented in Table 14. Apparently, when pre-test scores are equalized, neither the trained nor the untrained subjects significantly improved their performance on the third classroom examination over what it had been on the first two. Breaking the trained and untrained groups into the two achievement levels and matching within each level on the pre-test yielded results similar to the overall comparisons in that no significant effect was demonstrated for training and the previously significant effect for trials was eliminated. These results are also presented in Table 18.

It may be recalled that, while trained subjects were encouraged to

Table 17

Mean Scores on $\frac{T1 + T2}{2}$ and Test 3 for Higher- and Lower-Achieving Trained Subjects

Achievement Level		Test: $\frac{T1 + T2}{2}$	Test: Test 3	Total
Higher	$\bar{x}$	31.50	30.94	31.22
	SD	2.26	3.73	5.59
Lower	$\bar{x}$	25.62	28.81	27.22
	SD	3.40	5.56	4.82

Note. Total possible score = 50. Significant effects found for Achievement Level, $p < .01$, and for Achievement Level x Test, $p < .05$.

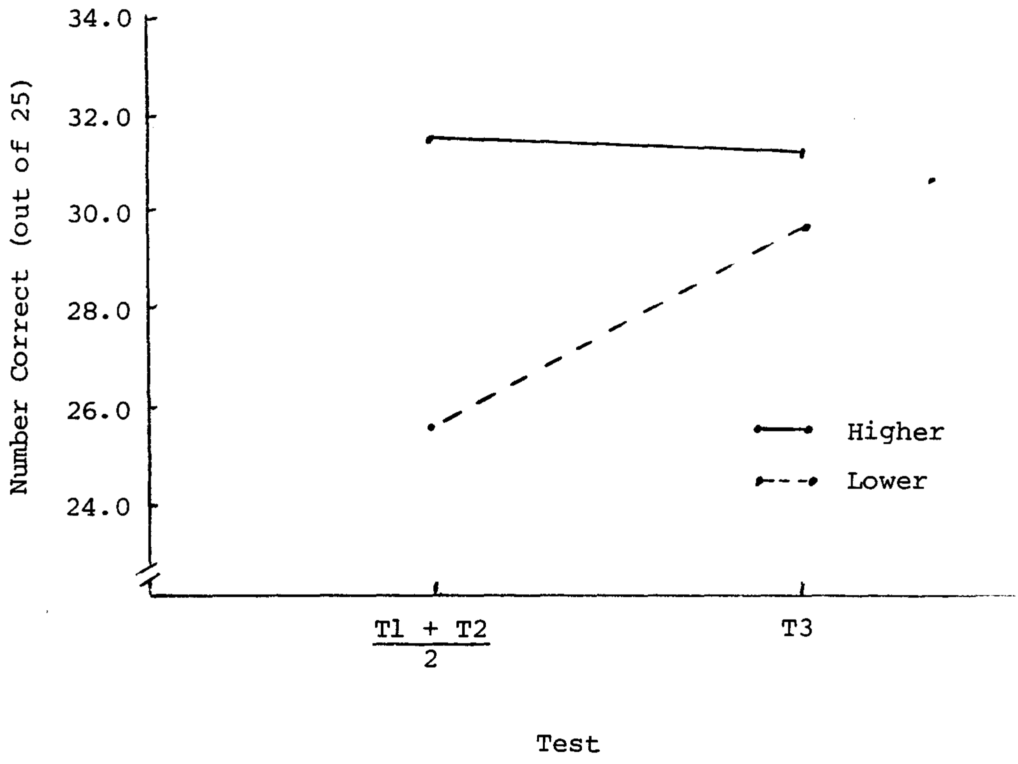

Figure 5. Means for $\frac{T1 + T2}{2}$ and Test 3 for Higher Achieving (n=16) and Lower Achieving (n=16) Trained Subjects.

Table 18

Mean Scores on $\frac{T1 + T2}{2}$ and Test 3 for Higher- and Lower-Trained and Untrained Subjects Matched on $\frac{T1 + T2}{2}$

Group		Test: $\frac{T1 + T2}{2}$	Test: Test 3
Trained Overall	$\bar{X}$	29.52	29.30
	SD	4.48	5.41
Higher-Achieving	$\bar{X}$	31.92	31.35
	SD	2.28	4.44
Lower-Achieving	$\bar{X}$	26.25	28.50
	SD	3.80	5.87
Untrained Overall	$\bar{X}$	29.48	30.30
	SD	4.46	6.88
Higher-Achieving	$\bar{X}$	31.90	32.90
	SD	2.45	5.96
Lower-Achieving	$\bar{X}$	26.40	27.10
	SD	3.85	5.27

Note. Total possible score = 50.

use the SPAR method on each of the three chapters (11 through 13) that they were studying in preparation for Exam 3, they were required to submit evidence of their having used it for only one of these three chapters (Chapter 12). It was hypothesized that, if in fact subjects used the method only for this chapter and not for the other two, the lack of effect for training found in these students' overall performance on Test 3 may have been due to their having spent a disproportionate amount of their total study time reviewing Chapter 12, and, consequently, paying less attention to the other two chapters covered by the test. If this hypothesis were true, one would predict that when the questions on the test were grouped according to which of the three chapters they were taken from, the trained students would score significantly higher than the untrained students on the questions taken from Chapter 12, the one which they reviewed using the SPAR method.

Table 19 presents the results of this analysis. Contrary to prediction, the trained subjects did not get significantly more of the Chapter 12 questions correct than did the untrained subjects, and, in fact, performed slightly less well on these items than the control group (Training: $\bar{X}$ = 14.58, No Training: $\bar{X}$ = 14.83). Similar results were found when the trained and untrained groups were divided into the higher and lower achievement levels as shown in Table 19. Analyses in which Chapter 12 scores were examined for subjects matched on both Test 3 overall score and on the average of their previous two tests also yielded nonsignificant results (see Table 20).

Table 19

Mean Scores on Questions Taken from Chapter 12 for Higher- and Lower-Achieving Trained and Untrained Subjects

Group		Achievement Level: Higher	Lower	Both Levels
Trained	$\bar{x}$	15.20	13.81	14.58
	SD	2.42	3.72	2.61
Untrained	$\bar{x}$	16.15	13.56	14.83
	SD	2.96	2.83	3.03

Note. Total possible score = 23.

Table 20

Mean Scores on Questions Taken from Chapter 12 for Higher- and Lower-Achieving Trained and Untrained Subjects Matched on Test 3 Overall Score and $\frac{T1 + T2}{2}$

Group		Matched Test: Test 3 Overall	Matched Test: $\frac{T1 + T2}{2}$
Trained:			
Higher-Achieving	x	15.50	15.20
	SD	2.28	2.42
Lower-Achieving	x	14.00	13.30
	SD	2.57	2.54
Untrained:			
Higher-Achieving	x	15.56	15.65
	SD	2.06	2.72
Lower-Achieving	x	13.78	12.80
	SD	2.86	3.22

Note. Total possible score = 23.

Prediction of Performance

One of the original aims of this study was to develop a formula for predicting which students would benefit most, in terms of improvement in test grades, from being taught a study skills method such as SPAR. Since, as indicated in previous analyses, this training approach was not demonstrated to have had any significant effect in improving test scores on the classroom examination above those of the controls, an analysis examining the extent of generalization of this training effect would not be appropriate. However, the identification of variables that would predict a student's performance on the tasks involved in this study was nonetheless of interest. Multiple regression analyses were performed to identify the best predictors of a student's performance on (a) The third classroom examination (b) the final grade in the course, and (c) the combined laboratory task (multiple choice plus short answer). The results of the first of these analyses are presented in Table 21. The best predictor of a student's performance on the third classroom examination was found to be the mean of that student's scores on the previous two examinations. The predictions made by this variable were found to be highly significant ($F(1,75) = 33.64$, $p < .001$). A second variable found to be a significant predictor of third test performance was locus of control as measured on the Rotter I-E Scale ($F(2,74) = 4.12$, $p < .05$). Two other personality variables also emerged as significant predictors of third test performance: the total positive score of the Tennessee Self Concept Scale ($F(3,73) = 4.97$, $p < .05$) and total score on the Marlowe-Crowne Social Desirability Scale ($F(4,72) = 2.64$, $p < .05$). The regression equation for this analysis was as follows:

Table 21

Significant Predictors of Scores on Classroom Exam #3 and Total Amount of Variance Explained

Dependent Variable	Significant Predictors	*F*	*p* <	r^2
Test #3 Class Exam	$\frac{T1 + T2}{2}$	33.64	.001	.409
	Locus of Control-Rotter	4.12	.05	
	Total Positive - TSCS	4.97	.05	
	Marlowe-Crowne SDS	2.64	.05	

Predicted T3 score = 46.90 + .555(Mean of T1 + T2) + .254(Rotter - Internal Locus of Control) - .192(Tennessee Self Concept Scale - Total Positive) - .151(Marlowe-Crowne). These four variables as predictors in the regression equation explained 40.9% of the total variance. The overall accuracy of prediction of this equation was also highly significant ($F(4,72) = 12.48$, $p < .01$). Presence in the training group did not prove to be a significant predictor of Test 3 performance.

With respect to predicting final grade in the Introductory Psychology course (Table 22), the mean of a student's first two examinations again proved to be the most accurate predictor ($F(1,75) = 70.54$, $p < .001$). The other significant predictors, in order of accuracy, were: Test 4 ($F(2,74) = 14.07$, $p < .01$), the femininity scale of the Bem Sex Role Inventory ($F(3,73) = 5.38$, $p < .01$), locus of control on the Rotter ($F(4,72) = 3.27$, $p < .05$), Test 3 ($F(5,71) = 4.84$, $p < .01$) and the Work Methods scale of the Survey of Study Habits and Attitudes ($F(6,70) = 2.65$, $p < .05$). Presence in the training group did not prove to be a significant predictor in this analysis ($F(8,68) = 1.72$, $p > .05$). The regression equation for this analysis was as follows: Predicted Final Grade = -2.76 + .499(Mean of T1 + T2) + .311(T4 score) + .167(Bem Scale - Feminine) - .167(Rotter - Internal Locus of Control) + .197(T3 score). Together the six significant variables explained 65.2% of the total variance, also highly significant ($F(6,70) = 21.86$, $p < .001$).

Finally, Table 23 indicates the variables found to be significant predictors of a student's total score on the laboratory task (Trial 1 + Trial 2 + Trial 3). Eight variables were found to be significant predictors. They were: performance on Trial 1 of the lab task ($F(1,85) =$

Table 22

Significant Predictors of Final Grade in Introductory Psychology Course and Total Amount of Variance Explained

Dependent Variable	Significant Predictors	*F*	*p*<	r^2
Final Grade in Intro Psych. Course	$\frac{T1 + T2}{2}$	70.54	.001	.652
	T4	14.07	.01	
	Femininity - BEM SRI	5.38	.01	
	Locus of Control-Rotter	4.84	.01	
	Work Methods - SSHA	2.65	.05	

Table 23

Significant Predictors of Total Score on Lab Task
and Total Amount of Variance Explained

Dependent Variable	Significant Predictors	*F*	*p* <	r^2
	Trial 1 - Total Score	280.94	.001	
	Trial 3 - Total Score	175.02	.001	
	Trial 2 - Total Score	59.66	.001	
Total Score on Lab Task	Presence in Trng. Group	7.05	.01	.966
	Personal Self - TSCS	5.17	.01	
	Order of Passages	5.20	.01	
	Family - TSCS	2.40	.05	
	Work Methods - SSHA	2.04	.05	

280.94, $p < .001$), performance on Trial 3 of the lab task ($F(2,84) = 175.02$, $p < .001$), performance on Trial 2 of the lab task ($F(3,83) = 59.66$, $p < .001$), presence in the training group ($F(4,82) = 7.05$, $p < .01$), the Personal Self subscale of the Tennessee Self-Concept Scale ($F(5,81) = 5.17$, $p < .01$), order in which passages were presented ($F(6,80) = 5.20$, $p < .01$), the Family subscale of the Tennessee Self-Concept Scale ($F(7,79) = 2.40$, $p < .05$) and the Work Methods scale of the Survey of Study Habits and Attitudes ($F(8,78) = 2.04$, $p < .05$). The regression equation for this analysis was as follows: Predicted Total Score on Lab Task = -4.01 + .507(Trial 1 score) + .452(Trial 3 score) + .210(Trial 2 score) + .067(presence in training group) + .050(Personal Self Scale - Tennessee Self-Concept Scale) - .033(Family Self Scale - Tennessee Self-Concept Scale) + .032(Work Methods Scale - Survey of Study Habits and Attitudes). These eight variables in the regression equation explained 96.6% of the variance, a highly significant result ($F(8,78) = 279.63$, $p < .001$).

On the final examination in the class only one of the 36 students trained in the SPAR method turned in questions evidencing use of the method to prepare for the examination. Thus, analyses of achievement and personality factors predictive of students' use of the method when not receiving course credit for doing so were not able to be performed.

Group Differences on Background Variables

Also of interest in this study, in addition to the effects of training, were the personality and academic characteristics of the two achievement groups sampled. Previous studies (Bednar & Weinberg, 1970;

Robyak & Downey, 1978; 1979) have found differences in certain personality variables (e.g., locus of control, depression) among students achieving at different levels academically. The present study sampled a wide variety of personality variables previously found to be correlated with academic achievement, and also included other variables believed to be relevant to academic performance, such as ACT scores. Table 24 lists the means and standard deviations for each of the four background variables on which the two achievement groups sampled in this study were found to differ significantly. The three ACT scores (English, Math and Composite) were each significantly different ($\bar{X}$ Eng.: Higher = 19.53, Lower = 15.40; $\bar{X}$ Math: Higher = 19.04, Lower = 13.38; $\bar{X}$ Comp.: Higher = 20.53, Lower = 15.33, all p-values $< .001$), as were the scores on the affiliation scale of the Edwards Personal Preference Schedule (Higher: $\bar{X}$ = 14.51, Lower: $\bar{X}$ = 11.71). Nearly significant differences were also found on the Beck Depression Inventory (Higher: $\bar{X}$ = 6.91, Lower: $\bar{X}$ = 11.64, $t(85) = 1.93$, $p < .06$), and the masculinity scale of the Bem Sex Role Inventory (Higher: $\bar{X}$ = 100.82, Lower: $\bar{X}$ = 107.69, $t(85) = 1.89$, $p < .06$). A correlation matrix indicating the correlation coefficients for all of the variables employed in the study is illustrated in Table 25.

Table 24

Means and S.D.'s for Variables Found To Be Significantly Different Between Higher and Lower Achievement Levels

Variable	Mean	S.D.	*t*-value	*p* <
ACT-English	H = 19.53	4.14	4.62	.001
	L = 15.40	4.19		
ACT-Math	H = 19.04	5.80	4.60	.001
	L = 13.38	5.66		
ACT-Comp.	H = 20.53	3.88	5.60	.001
	L = 15.33	4.76		
EPPS-Affiliation	H = 14.51	4.68	2.90	.005
	L = 11.71	4.30		
BDI-Depression	H = 6.91	0.82	1.93	.06
	L = 11.64	2.39		
BSRI-Masc.	H =100.82	13.19	1.89	.06
	L =107.69	20.18		

Note. H = Higher Achievement Level, L = Lower Achievement Level.

Table 25

Correlation Matrix Indicating Correlation Coefficients
for All Subject Variables Employed

	ACTE	ACTM	ACTC	DA	WM	TA	EA	SO	TSCSSC	TSCSP	TSCSR1	TSCSR2	TSCSR3	TSCSPY	TSCSME	TCSCPRS
ACTE	-	.725	.881	-.213	.070	.155	.017	.001	-.121	.014	.209	-.250	.138	-.056	-.008	.116
ACTM		-	.874	-.221	.018	.169	.044	-.007	-.214	.108	.213	-.207	.215	.038	-.001	.106
ACTC			-	-.179	.115	.186	.079	.051	-.198	.075	.170	-.171	.178	-.026	-.029	.134
DA				-	.658	.365	.650	.827	-.233	.100	-.160	.330	-.018	.069	-.072	.066
WM					-	.503	.578	.837	-.369	.212	.042	.154	.173	.274	-.102	.001
TA						-	.658	.761	-.315	.145	.026	.062	.166	-.057	.009	.271
EA							-	.864	-.367	.155	-.021	.256	.027	-.073	-.018	.154
SO								-	-.386	.184	-.040	.246	.105	.070	-.058	.150
TSCSSC									-	-.010	.053	.187	-.005	.040	.097	-.205
TSCSP										-	.558	.549	.592	.461	.326	.526
TSCSR1											-	-.045	.051	.176	.245	.369
TSCSR2												-	-.037	.132	.318	.318
TSCSR3													-	.446	.049	.218
TSCSPHY														-	-.148	.083
TSCSME															-	.030
TSCSPRS																-
TSCSFAM																
TSCSSOC																
ROTI																
ROTE																
MCSDS																
BDI																
AAT-D																
AAT-F																
BSRI-M																
BSRI-F																
BSRI-A																
EPPS-AF																
EPPS-AC																
TRNG																
ACHGRP																

Table 25 (con't.)

Correlation Matrix Indicating Correlation Coefficients for All Subject Variables Employed

	TCCSFAM	TSCSSOC	ROTI	ROTE	MCSDS	BDI	AAT-D	AAT-F	BSRI-M	BSRI-F	BSRI-A	EPPS-AF	EPPS-AC	TRNG	ACHGRP
ACTE	.055	-.004	-.174	.174	-.343	-.022	-.061	-.122	.041	-.120	-.197	.241	-.091	.085	-.422
ACTM	-.011	.123	.007	-.007	-.310	-.080	-.076	-.091	.116	-.285	-.307	.287	-.044	.070	-.462
ACTC	-.019	.068	-.100	.100	-.323	-.130	-.147	-.074	.040	-.242	-.224	.327	-.091	.134	-.547
DA	-.195	.225	.115	-.115	.353	-.302	-.399	.084	.229	.281	.006	-.113	.244	-.049	-.023
WM	-.174	.319	.173	-.173	.290	-.311	-.635	.147	.260	.117	-.159	.037	.042	-.041	-.110
TA	-.182	.140	.202	-.202	.150	-.245	-.456	.041	.166	-.069	-.212	.018	.073	-.037	-.055
EA	-.185	.234	.096	-.096	.313	-.354	-.470	.067	.035	.083	.007	-.152	.192	-.115	-.208
SO	-.224	.279	.180	-.180	.338	-.366	-.594	.103	.219	.132	-.110	-.036	.169	-.070	-.112
TSCSSC	.225	-.216	.023	-.023	-.308	.401	.292	-.024	-.228	.024	.223	-.061	-.120	.077	.114
TSCSP	.222	.468	.225	-.225	.135	.159	-.114	.056	.057	.008	-.053	-.054	-.057	-.006	-.125
TSCSR1	.272	.203	.106	-.106	-.160	.212	.012	-.139	-.172	-.196	.028	.101	-.190	-.157	-.124
TSCSR2	-.051	.301	.070	-.070	.393	-.106	-.093	.153	-.137	.246	.272	.022	-.003	-.156	-.073
TSCSR3	.165	.262	.182	-.182	-.054	.176	-.113	.071	.371	-.057	-.373	-.184	.075	.262	-.017
TSCSPHY	.010	.234	.176	-.176	.229	.000	-.235	.162	.206	.148	-.116	-.012	.020	-.077	-.014
TSCSME	.009	-.130	.049	-.049	-.009	.356	.196	-.209	-.396	-.090	.289	-.056	-.125	.031	-.005
TSCSPRS	.006	.020	-.025	..025	.039	-.050	-.048	-.088	-.007	-.002	.001	.212	-.009	-.193	-.030
TSCSFAM	-	-.111	.038	-.038	-.120	.171	.183	-.071	-.027	-.104	-.038	-.044	-.078	.061	-.191
TSCSSOC		-	.116	-.116	.124	-.042	-.214	.356	.191	.001	-.158	.000	-.119	-.030	-.165
ROTI			-	-.100	.133	-.082	-.205	-.052	.125	-.081	-.173	-.105	.066	.070	.105
ROTE				-	-.133	.082	.205	.052	-.125	.081	.173	.105	-.066	-.070	-.105
MCSDS					-	-.164	-.267	.135	-.027	.243	.152	-.215	.200	.055	.194
BDI						-	.412	-.038	-.130	.035	.140	-.120	-.208	-.005	.176
AAT-D							-	-.209	-.195	.026	.217	-.086	-.035	.073	.056
AAT-F								-	.115	.067	-.071	.013	-.278	-.103	.054
BSRI-M									-	.136	-.753	-.158	.245	.126	.118
BSRI-F										-	.528	.104	-.064	-.007	.082
BSRI-A											-	.185	-.238	-.114	-.018
EPPS-AF												-	-.494	-.134	-.236
EPPS-AC													-	-.003	.048
TRNG														-	-.060
ACHGRP															-

Legend for Table 25

ACTE	- ACT English score
ACTM	- ACT Math score
ACTC	- ACT Composite score
DA	- Survey of Study Habits & Attitudes - Delay Avoidance Scale
WM	- Survey of Study Habits & Attitudes - Work Habits Scale
TA	- Survey of Study Habits & Attitudes - Teacher Acceptance
EA	- Survey of Study Habits & Attitudes - Educational Attitudes
SO	- Survey of Study Habits & Attitudes - Total Score
TSCSSC	- Tennessee Self-Concept Scale - Self Criticism Scale
TSCSP	- Tennessee Self-Concept Scale - Total Positive Scale (Positive Feelings About Oneself)
TSCSR1	- Tennessee Self-Concept Scale - Identity Scale
TSCSR2	- Tennessee Self-Concept Scale - Self-Satisfaction Scale
TSCSR3	- Tennessee Self-Concept Scale - Behavior Scale
TSCSPHY	- Tennessee Self-Concept Scale - Physical Self Scale
TSCSME	- Tennessee Self-Concept Scale - Moral-Ethical Scale
TSCSPRS	- Tennessee Self-Concept Scale - Personal Self Scale
TSCSFAM	- Tennessee Self-Concept Scale - Family Self Scale
TSCSSOC	- Tennessee Self-Concept Scale - Social Self Scale
ROTI	- Rotter I-E Scale (Internal)
ROTE	- Rotter I-E Scale (External)
MCSDS	- Marlowe-Crowne Social Desirability Scale
BDI	- Beck Depression Inventory
AATD	- Achievement Anxiety Scale (Debilitative)
AATF	- Achievement Anxiety Scale (Facilitative)
BSRIM	- Bem Sex Role Inventory (Masculine)
BSRIF	- Bem Sex Role Inventory (Feminine)
BSRIA	- Bem Sex Role Inventory (Androgyny)
EPPSAF	- Edwards'Personal Preference Schedule (Affiliation)
EPPSAC	- Edwards'Personal Preference Schedule (Achievement)
TRNG	- Presence in Training Group (1=Trng; 2=No Trng)
ACHGRP	- Achievement Group (1=lower; 2=higher)

CHAPTER IV

DISCUSSION

Possibly the most interesting result of this study is the finding that some students will benefit to a greater or lesser degree from study skills training depending upon the type of test used to assess their retention of studied material. In this study students achieving at a slightly below average level who were trained in the SPAR method were found to demonstrate significantly greater retention than control subjects when a short answer (recall) task was administered. The same subjects showed no effect of training when a multiple choice (recognition) test on the same material was administered. This result would appear to suggest that the type of test employed to assess retention is an important factor in the evaluation of the effectiveness of various study skills training procedures.

The consideration of possible recall - recognition differences in response to a treatment is not totally unprecedented. Peterson (1979) used type of test as a dependent variable in her study of the effects of different styles of classroom teaching. While she found no main effects for her various treatments, she did find interaction effects between treatments and personality variables of the students which differed depending upon whether the students were given an essay or a multiple choice test. However, among the many evaluations of study skills training discussed in the review at the beginning of this paper, virtually none of them appears to have taken type of test into account. This may explain, in part, some of the ambiguity in the literature regarding which methods are effective in producing improvement from training in study skills.

The specific reasons why improved performance was demonstrated on the short answer test and not on the multiple choice test are not clear. It may be that the type of processing encouraged by SPAR and related approaches is more conducive to recall performance where interrelationships among various concepts and their significance in the broad realm is often the focus. Processing for recognition, which frequently requires attention to more minute details of the material would seem to be discouraged by these approaches, or at least not actively encouraged, in favor of getting "the bigger picture." Indeed, Schmeck's work (Schmeck et al., 1977, 1979) which distinguishes between deep and shallow processing of information and which was incorporated into the SPAR method in the present investigation, encourages students, in order to be deep processors, to attend to the features of the material related to its overall significance and to draw broad connections between new and previously-learned material. Attending to more shallow aspects of the material, such as the association between one simple fact and another, is generally discouraged. Thus, it would appear that the methods most often employed to train students in study skills by their very nature would show greater benefit when employed in a recall test, such as an essay or short answer, than in a multiple choice test where other, different methods may be required.

An alternative hypothesis to explain the improved performance by higher-achieving students on the short answer task involves the fact that the trained students spent significantly more time studying the material than did the controls. One might raise the question, if time spent studying were the crucial factor in improved performance on the short answer task, why was such improvement not demonstrated on the multiple choice task? It could be that increased exposure to new material has differential effects on the processes of recall and recognition learning, such that recall is improved, while recognition remains largely unaffected. If this were the case, the improved performance shown by the higher-achieving students on the short answer task could be attributed to the increased time they spent reading the material, and not to the training they received. However, it should be recalled that the higher-achieving trained students did spend significantly more time on Trial 2 of the Short Answer task than did the untrained students, and yet did not score significantly higher on this trial. This fact would seem to make the increased time spent by the trained students less likely an explanation for the improved performance they demonstrated.

Another interesting finding in the present investigation was that this recall - recognition difference was demonstrated only for the students in the higher of the two achievement groups. Students in the lower group showed no such pattern and, in fact, appeared unaffected on any measure by any phase of the treatment. One possible reason for this is to note that these students were achieving at extremely low levels (D and below). It may be that the deficits possessed by these students in areas important to academic functioning were simply too serious to be addressed adequately by the treatment employed in this study. That is, it would seem that the goal of SPAR and related approaches is to fine-tune students' basic skills of reading and understanding so as to make their study behaviors more efficient and effective. However, it could be argued that if a student's grasp of these basic skills is somewhat less than secure, a program designed to further refine such skills would undoubtedly be doomed to failure.

Data supplied by the control subjects in this study would seem to lend some support to this hypothesis. The lower achievement group showed significantly poorer performance in vocabulary, reading comprehension overall and in drawing inferences from what they read. Since each of these three skills would seem to be important to effective academic functioning, it may have been the case that the lack of training effect observed among the lower students was due to the SPAR method's failure to address adequately the educational needs of these students. For students of this type a more intensive program of remedial training in reading, writing and other basic skills might seem to be more appropriate, perhaps followed by a SPAR-type approach if necessary at some later date. Cronbach's (1957, 1975) suggestion of the need to take subject characteristics into account when designing treatments would appear especially relevant to this issue.

Only one other study systematically varied achievement level and used it as an independent variable in an examination of response to study skills training (Robyak et al., 1978). However, the authors of this study defined each of their achievement groups in somewhat idiosyncratic ways (higher-achieving students termed "academically apprehensive"; lower students termed underachievers) and also did not provide any measures of ability such as reading and/or vocabulary scores. Thus, the actual skill levels of the students in each group could not be ascertained, and the support the data from this study might provide to the hypothesis offered above to explain the lower students' lack of apparent benefit from training in the SPAR method is not clear.

Another objective of the present study was to evaluate the relative effectiveness of each of the separate techniques comprising the SPAR method and to estimate its contribution to any overall benefit derived from the method. An interesting result of the study was that for the higher-achieving subjects on the short answer task a rather dramatic decrease in performance was revealed in Session 2 in which the technique of Asking Questions to oneself about what one is reading was introduced. Prior to the introduction of this technique, in Session 1, and subsequent to its introduction, in Session 3, the trained subjects demonstrated clearly superior scores relative to the controls on the short answer test, but in Session 2 they dipped slightly below the controls and significantly below their own mean scores for Sessions 1 and 3. Apparently, the process of asking questions in some way interfered with subjects' recall of the important concepts in the passages they were reading.

One possible reason for this is that subjects may have perceived the process of making up questions as the task to which they were being encouraged to attend, instead of viewing it as a means to the end of better retention of the important points in the passage. Since in Session 1 subjects were not required to hand in anything to the experimenter except their answers to the test questions, requiring written questions to be turned in during Session 2 prior to subjects' taking the test on the material may have made them believe that the former task was the important one. If this were the case, it might take on some aspects of an incidental learning situation in which subjects were told to try to recall the important points in the passage but were also given an orienting task that was somewhat different from that of simply attempting to remember what they read. Zechmeister and Nyberg (1982) in their discussion of incidental learning situations of this type, state that orienting tasks can interfere with normal memory processing, resulting in poorer retention. This may have been why subjects' scores showed such a dramatic decrease in Session 2.

Another possibility is that the task of making up questions without answering them may have represented a somewhat artificial dichotomizing of two processes that normally go hand-in-hand, i.e., making up questions and then answering them. Being required only to make up questions and not to provide the answers may have upset this natural progression and interfered with subjects' normal patterns, thereby decreasing retention and subsequent recall.

On the other hand, it may have been the case that making up questions and actually writing them down was something very different from the way most students typically study, and resulted in poorer retention simply because it was unfamiliar. An examination of the techniques listed by the control students as ones they employed to help them prepare for the third class examination reveals some support for this hypothesis. None of the students who turned in sheets listing the methods they used to prepare for the test mentioned "writing out lists of relevant questions," as a method they had employed. A few students indicated that they had a friend or roommate ask them definitions of terms, etc., but none apparently had actually written out questions to use in testing themselves. If this task did, then, provide a significant departure from the students' normal methods of studying, it may be that learning new study skills, like learning any other skill, may require a "breaking in" period of practicing the unfamiliar behaviors before successful use of them can be achieved.

Although the higher-achieving group of students showed some effect of training on the short answer task, the overall effect of training for all the subjects in the experiment on the laboratory task was not significant. While overall means for trained subjects were decreased somewhat by the higher students' dip on Session 2, nevertheless the SPAR method generally proved ineffective in improving students' scores above those of the control subjects. One possible reason for this is that the number of sessions provided in which to train subjects in the method may not have been sufficient for them to grasp completely the skills that were being taught. The three-session schedule was decided upon as a compromise between what might have been ideal and what was practically feasible given the availability of subjects and the time constraints involved in collecting the data over a one-semester period. Even so, the number of training sessions did fall within the three- to eight-session range cited by Kirschenbaum and Perri (1982) as being employed in successful study skills training programs, although admittedly it was at the very bottom of the recommended range. In addition, only 15-20 minutes of each session were devoted to actual training of the subjects with the remainder of the session taken up by subjects' reading of the test passages. Especially for subjects in the lower-achieving group who may have learned at a slower rate, this may not have constituted sufficient time for the essential features of the method to be acquired to a significant enough extent to be demonstrated in improved performance.

Another possible explanation for the lack of training effect in the laboratory task was that the subjects, though all achieving below the mean in the psychology course, may not have been highly motivated to improve their grades. Moreover, even if they were motivated to improve, they may not have seen the connection between what took place in the laboratory task and any resultant improvement in their grades. Subjects may have simply been participating in the study in order to earn the research credits necessary to fulfill their requirement in the course. The fact that only one of the 36 subjects trained in the method chose to use it to prepare for the final exam (or at least evidenced use of the method by turning in questions) would seem to support this hypothesis. Although the use of volunteers only (i.e., students who have come to a university counseling center requesting help with study skills) as subjects in investigations of the efficacy of various study skills methods (e.g., Robyak, 1977; Robyak & Patton, 1977) presents methodological problems of its own in terms of possible placebo effects, the approach employed by some investigators (e.g., Richards, 1975; Richards et al., 1976; Richards et al., 1978) whereby students are requested to participate who are "seriously concerned about their study habits," (Richards et al., 1978, p. 377) might be a reasonable compromise. Indeed, it would seem that for some students simply receiving a passing grade might constitute academic success, whereas for others, receiving anything less than an A or a B might constitute failure. Mitchell et al. (1974) in their review of then-existing study skills training programs concluded that employing non-volunteer subjects frequently made it difficult to establish a significant positive effect of training.

One difficulty in selecting students who are highly motivated to improve their academic performance is that there currently exists no instrument designed to adequately measure this construct. The instruments that are typically employed for this purpose, such as the Achievement via Independence and Achievement via Conformity scales of the California Psychological Inventory (Peterson, 1979; Rutkowski et al., 1975), the Mehrabian Measure of Achieving Tendency (Halperin & Abrams, 1978; Weiner & Potepan, 1970) and the achievement motivation scale of the Edwards Personal Preference Schedule employed in the present study, all measure general motivation to achieve, but do not contain items relevant specifically to academic achievement. Thus, students who aspire to be outstanding athletes or musicians or chess-players, but who have little desire to succeed academically, would probably tend to score highly on these commonly-used measures of achievement motivation. Such students would then be considered by investigators of study skills programs as highly motivated to improve their grades when, in fact, they are relatively satisfied with their present level of academic achievement.

The lack of success of the SPAR method in producing improved performance on the third class exam also deserves comment. One fairly obvious explanation is that the class examination was a multiple choice test, not an essay test and, as discussed earlier, the results of the laboratory task in this study demonstrated improved performance as a result of training in the SPAR method only for the higher-achieving students on the short-answer task. Had the class examination been a recall test, perhaps an effect of training might have been observed for at least some of the students in the higher achievement group.

Another possible explanation for the lack of training effect on the class exam is that the students may not have learned the SPAR method adequately enough during the laboratory phase to transfer their application of it to the class exam. Since there was no overall effect of training on the laboratory task this explanation would seem reasonable. If the effect of the method could not be demonstrated in the relatively well-controlled confines of the laboratory, it would seem to follow that in the less well-controlled classroom examination setting few effects would be observed.

Another possible explanation for the lack of improvement shown by the trained subjects on the classroom examination relates to the decrease in performance observed on the short answer task for the higher-achieving subjects. Since subjects were required on the class exam task to submit to the experimenter as evidence of their having used the SPAR method only a list of questions and their answers from one of the chapters in their textbook, many subjects may have simply halted their use of the method at this point and not gone on to use the questions to review and test themselves. If this were the case, a process similar to that which occurred in Session 2 of the laboratory task may have been operating to keep students' test scores at the level of the controls. That is, if we assume that something about the Asking Questions component of the SPAR model when employed without the succeeding steps operates to affect negatively students' retention of material, then if the students had employed only the steps up to this component without using the following components, their recall of material may have suffered as a result.

However, certain differences between the two tasks may weaken the tenability of this hypothesis. First of all, the class examination was a multiple choice test and the dip in students' performance observed on the short answer test did not appear on the multiple choice test in the laboratory. Thus, it is possible that the Asking Questions component, when employed without succeeding components, has no adverse effect on recognition memory. Secondly, the subjects in Session 2 of the laboratory task were required to make up questions about their passages, but not answers, whereas the subjects prior to the class examination were required to include the answers to the questions they made up. One of the hypotheses considered in explaining the dip in Session 2 was that making up questions without answering them represents a separation of two processes that typically follow one after the other. To the extent that this explanation is true, it would appear to weaken the tenability of the hypothesis that similar processes were operating in the class examination and in Session 2 of the laboratory task.

One part of this hypothesis that might have some merit, however, as a means of explaining the lack of training effect on the class examination is the fact that it is difficult to know for certain how faithfully students adhered to the prescribed steps of the SPAR method. Students may, for example, have simply opened their textbooks to the required chapter and quickly jotted down a list of questions, then scanned the chapter for the answers and just as quickly written them down, without really concentrating on what they were doing. Some evidence to support the hypothesis that students may not have followed the SPAR method exactly as it was presented while preparing for the classroom exam can be found by examining the estimates of the amount of time spent studying for the exam by the experimental and control groups (see Table 12) and comparing these with the amount of time spent by each of these groups reading their passages in the laboratory task (Table 11). In the laboratory task it was revealed that using the SPAR method required significantly more time than not using it, especially when all four components were employed. However, subjects' estimates of the amount of time they spent preparing for the third class examination revealed no difference between the estimates of the trained subjects, who were supposedly using SPAR, and those of the controls who were not. Thus, it could be that subjects in the training group did not employ the method as it was meant to be employed and, as a result, showed no improvement on their classroom examination.

One of the original aims of this study was to develop a profile, including both achievement and personality variables, of the type of student most likely to benefit from study skills training programs similar in their basic components to the SPAR method. However, since no overall improvement was demonstrated in either the laboratory task or the class exam, the role that certain personality variables might have played in the students' improvement cannot be determined. Nevertheless, some personality variables were found to be significantly predictive of students' scores on the third class exam and these deserve mention. Internal locus of control emerged as the best of the personality variables measured in predicting Test 3 scores. The importance of this construct and its close relationship with academic achievement has been noted in previous studies (Gozali et al., 1973). It would appear to make sense intuitively that students who feel more control over their environment might see a stronger relationship between the amount of time they spend studying for an exam, and their subsequent score on it, and, if they desired to do well, might expend more effort in preparation. Students who felt that their fate was largely controlled by external forces, on the other hand, might tend to have a more fatalistic attitude toward their exam performance and would not see the potential value of studying for it a great deal.

The other two personality variables that emerged as significant predictors of class exam score are not so intuitively interpretable. The total positive score of the Tennessee Self-Concept Scale and the score on the Marlowe-Crowne Social Desirability Scale were both found to be significant predictors of Test 3 scores, but the relationship for each of these constructs to Test 3 scores was a negative one. That is, students with lower overall self-concepts and who have a less strong need to obtain approval by responding in a culturally appropriate and acceptable manner were found to score higher on Test 3. Although this finding is somewhat counter-intuitive, and would seem not to support results of some previous investigations (e.g. Petzel, 1972) in which students with higher need for social approval tended to be more accurate in their estimates of future exam performance, it may be that in this study subjects who were willing to admit to their own weaknesses were those who felt a greater need to study in order to do well academically. Those subjects with higher self-concepts and who respond in a more societally acceptable manner may be a bit overconfident of their ability, or as Covington and Omelich (1979a, 1979b) point out, may be defending against self-attributions of a lack of ability by actually studying less so they can attribute their lack of success to this factor.

On the laboratory task, only two personality variables emerged as significant predictors - the Personal Self and the Family Self scales of the Tennessee Self-Concept Scale. The former is said to measure "an individual's sense of personal worth apart from his body or his personal relationships," (p. 3) while the latter measures, "one's feelings of adequacy, worth, and value as a family member. It refers to the individual's perception of self in reference to his closest and most immediate circle of associates," (p. 3) (Fitts, 1964). The personal self scale had a positive relationship to scores on the laboratory test, while the family self scale had a negative relationship. Again, the explanation for the existence of these relationships is not readily apparent. It may be that the personal self scale is a "purer" measure of self-esteem than the overall one reflected in the total positive score, which had a negative relationship with scores on the class exam, as discussed above. If this is the case it would seem that students who really had good feelings about themselves (high self-esteem) would tend to do better on the laboratory task, which seems to be in line with what one would expect based on studies of the relationship between self-esteem and achievement (Johnson, 1981; Butkowsky et al., 1980). The students mentioned above in discussion of the class exam who may have appeared to have high self-esteem because they were defending against the conclusion that they lacked ability may not have felt that anything was at stake in the laboratory task and thus responded to it in a more natural, i.e., less defensive, way. The negative relationship between scores on the laboratory task and the family self scale may be due to some idiosyncratic features of the subjects in this study. Many of these students are from immigrant families and are first- or second-generation Americans. Often they are the first in their families to attend college. Unsystematic observation of some of these students has revealed that many experience conflicts with their families around the issue of their attending college and often feel alienated from their families as a result. These students may feel more pressure to prove themselves and the highly controlled conditions of the laboratory task may have made it easier for them to do this.

Interestingly, presence in the training group was found to predict significantly scores on the laboratory task. This analysis may demonstrate the relative superiority of the higher trained students on the short answer task, since predicted scores were a combination of multiple choice and short answer scores.

In general, however, personality and other background variables, though significant, were not the most accurate predictors of scores on either the laboratory task or the class exam. The best predictors on both of these analyses were the students' scores on previous tests of the type being predicted. While this may be obvious considering the fact that in the laboratory task scores on each trial were included in the total score and, thus, would be expected to have a strong relationship with the total, the relationship held on the class exam as well where the scores from the previous tests were independent of Test 3 scores. This would seem to indicate that, while personality and related variables can add to the predictability of certain previous patterns of achievement, the single best predictor of future achievement is past achievement in a similar situation.

CHAPTER V

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

From the results of this study we can conclude that the type of test a student takes (i.e. recall vs. recognition) after being trained in study skills can affect the score he/she will receive on that test. This, in turn, will affect the evaluation of the efficacy of the study skills training program that is subsequently made. The notion that a study skills approach may be more beneficial in preparing for one type of test than for another is one that has apparently not been considered by researchers in the area of study skills training up to the present time. Undoubtedly, more research examining the reasons why preparing via the SPAR and related methods is more successful on recall-type tests than on recognition tests is needed. In addition, exploration of alternate strategies that may be helpful for performance on multiple choice tests would also be valuable.

A second conclusion that can be drawn from this study is that, in addition to study skills approaches being more helpful for certain types of tests, it also appears that they may be more helpful for certain types of students. In this study, students who were achieving at a level slightly below the class mean seemed to profit more from training than did lower-achieving students, at least when they were administered a short answer test. Future investigators in the area of study skills training would apparently do wise to pay attention to this variable, especially with regard to the possible existence of certain minimum levels of achievement that may be necessary in order to benefit from most study skills approaches.

Another conclusion that can be drawn from this study is that certain specific study techniques may be more beneficial to academic performance than others, or at least may interact with certain subject characteristics to produce greater benefit. In this study, the technique of Asking Questions led to poorer recall for higher-achieving students on the short-answer task. Thus, studies that fail to specify the exact methods employed to train students in study skills and simply refer to the process in a very general way would apparently be inviting confusion regarding the relative effectiveness of various techniques.

There appears to be a general need for further exploration of the possibility of Aptitude x Treatment interactions in the design and implementation of study skills training programs. Specifically, more thorough examination of the role of motivation to improve one's academic achievement, preferably via an instrument designed to measure this specific construct, would seem especially important. In addition, empirical studies of some of the more practical aspects of training students to improve their grades, such as the number of sessions required and the possible interaction of this variable with achievement level, would seem to be of value in future studies.

Finally, and perhaps most importantly, it would seem essential for teachers, counselors and others involved in working with students to recognize that the problem of poor academic achievement is a multifaceted one. In attempting to design an effective treatment program then, a critical first step would seem to involve a thorough assessment of why a student is failing. If the student, for example, has a knowledge of effective study techniques, yet is troubled by personal or emotional difficulties that are interfering with his/her ability to concentrate, some form of psychotherapy or personal counseling might be recommended. If, on the other hand, the student has no serious personal difficulties, but simply has no knowledge of which study techniques are most effective, instruction in study skills alone might be sufficient. Finally, if the student has no serious personal difficulties and does have a knowledge of effective study techniques, yet has difficulty motivating him/herself to employ them, a program emphasizing some of the behavioral self-control techniques might be most helpful. Only after the reasons behind a student's poor achievement are specified can a program to modify these factors be designed and implemented. It would seem that continuing the practice of treating all poor students in the same way with the same type of program, as has been done in many of the studies reported to date, would be ignoring potentially important information that would result in more effective training programs and more productive students.

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APPENDIX A

APPENDIX A - PASSAGES USED IN LAB TASK

PEOPLES OF AUSTRALIA

White Majority and Aborigines

Out of a total population of more than 14 million, the overwhelming majority of Australians belong to the Caucasian race. Some 30 or 40 years ago, one could have added that, except for a small minority, the major population came from Anglo-Saxon and Irish stock. To a lesser extent, this is still true. Since the end of World War II, however, there has been an influx of about 3,000,000 immigrants from more than 60 countries - the majority from the British Isles. The large-scale immigration has been a major factor in changing a people with an insular mentality into an outward-looking and cosmopolitan nation. As one would expect, the change is most marked among the nation's youth.

Since the abandonment of the so-called "White Australia" policy - which never existed officially but created difficulties for non-white immigration to the country - Australia has become a melting pot of races. According to the last published census (1971), major immigrant groups were: English, Welsh and Scots, 1,024,000; Irish, 66,000; Germans, 110,000; Greeks, 160,000; Italians, 289,000; Dutch, 99,200. Between 1971 and 1976, a further 350,000 immigrants have permanently settled in Australia.

To these figures should be added the unknown number of second and even third generation immigrants who, although born in Australia, still retain close cultural ties with their parents' homelands. The present policy of all Australian governments (federal and state) encourages "New Australians" (the term bestowed on immigrants in the early 1950's) to become naturalized citizens, retaining the cultural heritage of their native countries and sharing their inheritance with "old Australians." It is inevitable that it will be some time before difficulties - learning of English and adoption of a new lifestyle - are overcome and the immigrant fully adjusts to Australian conditions. But despite islands of discontent among certain immigrant groups, the process of adaptation has been astonishingly fast and successful in Australia. A large number of New Australians occupy distinguished positions in the economic, artistic, scientific, and cultural life of the country.

The Aboriginals

It is a sad paradox that the aborigines, who lived in Australia many thousands of years before the first white man ever saw the continent, today represent the greatest problem to the Australian majority. In the last census (1971), 106,290 people registered as Aborigines and 9,663 as Torres Strait Islanders. But their estimated number is about 140,000, or 1% of the total population.

The Aboriginals' experience under white rule in the past is not an attractive story. When the First Fleet arrived, perhaps 300,000 of them roamed the wide expanses of Australia. They lived in some 450 tribes of various sizes but even the largest contained only a few scores of families. Each tribe had its own territory for hunting and food gathering and clashes between them over border transgressions and other infringements are supposed to have been rare. Except for those in Tasmania, they were a peaceful people. Their wordly goods consisted of wooden spears, boomerangs, stone axes, sticks for making fire, and grass bags. They wore no clothes; the dog was their only domesticated animal.

Whether they lived the lives of miserable Stone Age savages or were a happy breed in a paradisaical environment, saved for so long from destructive civilization, may be open to argument. But it is hardly surprising that the newly arrived whites stood uncomprehendingly before the Aboriginal enigma. They did not understand the deeper meaning of what appeared to them a near animal existence which filled them with revulsion and horror. After all, most of the early newcomers found themselves in Australia very much against their wish. Even the free settlers had come only with the aim of getting rich and getting out as fast as possible. Because Aboriginals were useless as exploitable slave laborers and a nuisance as occupiers of the land, they were brushed aside - peacefully, if possible; brutally, if necessary. As a result, whatever their original number might have been, within a century only a small fraction survived.

Steps Toward Equality for the Aboriginals

Towards the end of the last century it was believed that the Australian Aboriginal was doomed to die out in a few decades at most. Yet the contrary has happened. With more enlightened government policies, the Aborigines have not only survived but their numbers are fast increasing. Past wrongs inflicted on them cannot be undone but they are being compensated, to some extent, with specific efforts to assist their economic, social and cultural development. Since the referendum of 1967, which endorsed the abolition of all discriminatory laws, Aborigines have become fully fledged Australian citizens.

Education and industrial training of Aboriginals as well as land ownership procedures have been stepped up. In the past, official policy has been to attempt assimilation of the Aborigines with the white body politic. Now the emphasis is on what most Aboriginal leaders seem to demand: full citizenship and equal rights, with the right to maintain a separate cultural and social identity. Without question, the lot of the Aboriginal in Australian society made great strides in recent years. But there is plenty of room for further improvement. Even the most inveterate optimists believe that it will be a long time before the legally equal Aboriginal becomes a fully accepted member of Australian society.

The Australian Personality

Australians are easy to live with. This may be too sweeping a generalization and many Australians, who criticize their own nationals for petty bougeois attitudes, may energetically refute this statement. Yet, compared with the people of many other nations, Australians are more helpful, more tolerant, and more resistant to injustice than most.

These traits are not unmitigated blessings in every situation. For instance, the tendency of so many Australians to side with the real or imagined underdog in all circumstances has led them to believe that "authority is always wrong." Some analysts of the Australian scene have explained this phenomenon as an inheritance from the country's early colonial period when forebears of the present Australians had often misused authority in their effort to survive.

This distrust of authority, a basic feature of Australian life, is expressed on many levels. The Commonwealth Constitution, for example, provides that people must be asked by referendum whether they will agree to changing certain laws. During the past 76 years, only a few of these referendums have ended with an affirmative vote. But latent suspicion of power is manifested in more pedestrian ways. Police in a chase can count on very little help from passersby, not so much because Australians are afraid of becoming involved as because so many of them instinctively bestow the benefit of the doubt on the chased.

The popular Australian practice of "cutting down tall poppies to size" has nothing to do with gardening but is another form of the anti-authority phenomenon, an attempt to cut down people who have climbed too high in their respective fields.

Australians, as a whole, seem to be immune to hero worship in politics or government. In its two centuries of history, Australia has never had anyone approaching the status of a charismatic leader even for a brief period. Internationally successful sportsmen and women become temporary heroes as long as they don't appear to think that they are "better" than others. The same may be true for those who have achieved international recognition as artists, scientists, musicians, or writers. It is the talented rather than the humble or the average who must "know their place" to live happily ever after.

Classes In Australia

Public opinion polls have consistently shown that most Australians consider themselves middle class. The population includes a large proportion of trade union members who represent about 55% of the total work force. This is not surprising. While pockets of poverty exist mainly among the uneducated and untrained, the old and the Aborigines, Australia is hardly a country of paupers. Some 60% of all dwellings, for example, are occupied by people who own them or are paying them off in installments. Thousands more are saving for a deposit on a home. There are few families without a motor car, a refrigerator, radio, and TV. In a population of 14 million, there are more than 3.5 million telephone subscribers. Middle class is a rather flexible concept and it consists of a number of economic strata; most Australians will fit into one of them between the thin layer of have nots at the bottom and the even thinner ceiling of the very rich on top.

The ambition of most Australians to own a home surrounded by a plot of land has largely created the environment in which they live - the sprawling garden suburb with all its merits and disadvantages. Few Australians will live in a rented flat if they can help it, even an apartment of one's own or "home unit" is considered second rate except when it is in the luxury class. Despite its vast expanses, Australia is one of the world's most urbanized countries. About 85% of the population live in city and town conglomerates while only 15% live in rural areas. Still, that small garden plot is important because Australians are genuinely fond of being outdoors.

The Australian Language

One of the obstacles to an acquaintance between foreign visitors and Australians may be language. Australians speak English. But Australian English is spoken even by the educated with an accent which is quite noticeable and, in its extreme form, is sometimes unintelligible to the untrained ear. Lengthy and rather inconclusive arguments have been going on for many years about the origins, reasons for, nature and aesthetics of this accent. Some like it; others are outraged by it. Long ago, a poem appeared in the "Bulletin," Sydney, January 13, 1894, which ended, "Twere better if thou never sang/Than voiced it in Australian twang." Australians can be quite touchy on this subject and it may be wiser to accept their perfectly valid argument that it is their sweet right to pronounce their language as they want.

Besides a distinct accent of debatable felicity, Australians have also developed a large number of superb slang words. Here are a few examples of Australian contributions to colorful English. An "Abo" means, of course, an Aboriginal. Originally an "Anzac" meant a member of the Australian and New Zealand Army Corps who fought on Gallipoli in World War I; now the term includes all who served in any subsequent wars. "Aussie" can mean Australia or an Australian. "Back of beyond" is the remote inland. To "barrack for" is to shout encouragement to one's side. "Battlers" are persons who struggle for an existence; they are usually spoken of with compassion. A "black-tracker" is an Aboriginal employed mostly by police to find a lost or wanted person. An idler or a loafer who imposes on others is a "bludger." A red-haired person is nicknamed "Bluey." A "bloke" is a chap or fellow and "bonzer" means good or excellent, hence a"bonzer bloke" is a very nice chap. "Bullish" is a contemptuous term for nonsense or a baseless statement but, because of its derivation, is not used in polite society.

from Tucker, A. (Ed.) Fodor's Australia, New Zealand and the South Pacific, 1981. NY: Fodor's Modern Guides, Inc., 1981, pp. 65-72.

VIRUSES

A "virus" is not a disease, yet almost every year in late fall and very early spring, minor epidemics of unpleasant but seldom severe illness are common. Sore throat, fever, sometimes nausea and diarrhea - these are the symptoms, and when they appear, the sufferer is almost certain to be told, "You've got the virus."

This vulgar diagnosis is in most cases right, in fact if not in form. For these transient cold-weather ailments most frequently do result from virus infections, though neither the illness itself nor its symptoms can properly be termed a "virus." What the virus is, is the agent that causes the infection, a tiny submicroscopic particle that is not really alive but is nonetheless capable of multiplying in living organisms and inducing in them clear-cut signs of illness. It is important not to confuse the agent with its action, especially when, as here, there are thousands of different varieties of that agent, and only a few of them produce the action in question.

Viruses vs. Diseases

Most viruses do not attack man at all; their chosen enemies are other animals, wild or domestic, or plants or bacteria. And of those viruses that do infect man, the respiratory and intestinal viruses - some of which cause the kinds of cold-weather diseases we are talking about - are only two of the many known. The common childhood diseases, measles, mumps, and chicken pox, are also virus-caused. Warts and cold sores come from viruses, too - as do polio and rabies, and the major epidemic diseases (now largely controlled), smallpox and yellow fever. Even certain forms of cancer - in animals, and probably in man - are caused by viruses.

Thus, because viruses are a kind of entity in themselves, because they have many different hosts, and because only some of them truly cause disease, it is not appropriate to use the term "virus" for what is in reality a virus disease - and only a special kind of virus disease, of one particular host, at that. When speaking of mild virus infections of the nose and throat, it is easier and simpler, and more accurate, to employ the word "cold" rather than "virus."

How Complex Are Viruses?

Viruses then are, among other things, causative agents of disease. In this respect they resemble those other infective agents - bacteria, fungi, protozoa, and so on - that attack larger, more complex living organisms and cause them to suffer damage - mild or severe, as the case may be.

But viruses differ from these other disease-producing agents in important ways. To begin with, viruses are smaller and simpler. A typical bacterium may be about 1 micron (.001 millimeter, .00004 inches) in diameter, whereas the very largest virus, the vaccinia virus (used to vaccinate against smallpox), is only a quarter of that size; and the polio virus, one of the smallest, has a diameter of only 12 thousandths of a micron (12 millimicrons, as the scientists say).

With regard to complexity, there is simply no comparison. The typical microorganism is a complete little living cell in its own right, with a staggeringly intricate inner structure of membranes and minute organs ("organelles") and a content of many hundreds of thousands of different kinds of molecules, complex and simple, interacting with one another to keep the cell alive. The virus, on the other hand, is at its simplest composed of only two substances: a nucleic acid, which contains the essential genetic information of the virus, and a protein, to coat that nucleic acid and protect it from the vicissitudes of life on the molecular scale. It has even begun to seem that some viruses may dispense with their protein altogether and exist only as nucleic acid, but this is the exception, hardly the rule.

In addition to being smaller and simpler than microorganisms, viruses differ from them in that they are unable to function or multiply outside living cells. To be sure, most bacteria are somewhat choosy about their habitat and food supply, but scientists can generally learn what their requirements are and, from inert chemicals, make up suitable media for them to grow in. Not so with viruses. No scientist has yet succeeded in getting a virus to multiply in an entirely artificial medium. Viruses reproduce inside living cells and in no other place. When they have been separated from their living hosts and purified, viruses are simply inert chemicals, like many others in the chemist's cupboard.

The Structure of Viruses

As chemicals, viruses are not without interest, and a great many chemists have devoted their entire careers to the chemical study of viruses and their structural components. What such chemists have found can be summed up quickly: a typical virus is composed of several kinds of rather large molecules - the proteins and nucleic acids mentioned above - held together in a definite pattern. When the individual protein and nucleic acid molecules are examined chemically, their complex molecular structures can (at least in principle) be fully determined. And the natural packing of the individual protein and nucleic acid molecules into the virus particles has also been studied and found to follow purely physical laws, like those that regulate the formation of crystals. With several viruses, it has even been proven possible to take the particles apart, purify the individual molecular components and then put them back together again in such a way that they form intact, fully infective viruses.

Usually, virus particles have quite simple structures. Two patterns predominate: rods and spheres. The principal structural components are the protein molecules - hundreds of identical protein subunits packed in an orderly manner, rather like bricks in a chimney. The rod-shaped structures are, to be more precise, helical - which means that the subunits are arranged in a continuous spiral, like the staircase in a lighthouse. And the spheres are really polyhedra, solid forms with a great many polygonal faces, very much like the globes covered with tiny mirrors that rotated in dance halls of another era.

In both cases, the individual units are stacked together in a completely orderly fashion, which follows simple geometrical laws. In their nature and arrangement, the individual units are as inert and inactive as the sodium and chloride ions in a crystal of common salt - or the aforementioned bricks in a chimney.

How Viruses Multiply

If viruses are chemicals that can be studied in the test tube just as chemists study other kinds of chemicals, they are also something more - they have one capability that is shared by no other simple chemical system: they are capable of reproduction. Outside the cell the virus is an inert assemblage of chemicals; inside it, the virus engages in a whirlwind of activity, with the result that within an hour or so the infected cell disgorges a hundred new virus particles just like the one that went in.

On the face of it, it would seem that the virus is a typical little parasite, finding a host that can nourish it and taking advantage of the favorable environment provided by the host, to live and reproduce. But this is not quite true. The virus does not really draw nourishment from the host - being just a simple collection of chemicals, it doesn't need any nourishment - and it doesn't reproduce in the way that typical living creatures do, either. The virus cannot split itself in two; it cannot bud off little offspring viruses; it is incapable of producing virus spores or virus egg and sperm.

But the virus has, nonetheless, worked out a perfectly good system of its own for multiplying. What it does is take over the cell's machinery for producting protein and nucleic acid - probably the cell's most essential activity - and use it to make new virus protein and virus nucleic acid. These components finally come out together to produce new virus particles, each of which is ready to go out and face the world, just as its parent virus did: an apparently inert aggregate of chemicals, but one with a great hidden potential for increasing its own numbers, given the right opportunity.

How Viruses Cause Disease

The virus, of course, is concerned mainly with multiplying its own kind; and what happens to the cell it takes advantage of is, by and large, not the virus' problem. In a great many cases, the infected cell is completely destroyed by the virus. If this cell is a little single-celled creature in its own right - a bacterium, say - its death is the death of the organism. If, however, the cell is part of a large multicellular organism, like man, that cell too may die, but its loss may be unimportant and unnoticed as far as the parent organism is concerned. Nevertheless, with the death of each such cell, hundreds of virus particles may be released, and if every one of these infects a new cell, the destruction may continue at such an alarming rate that the organism cannot shrug off its losses any further. In that case, it gets sick. And if the virus infection is bad enough, and enough cells are destroyed, this organism, too, ultimately dies.

Most viruses damage only certain specific kinds of cells - not just animal cells or plant cells, nor even the cells of man rather than a mouse, but very specific kinds of cells indeed, like those lining the mucuous membrane of man's nose and throat (as is the case with the virus that causes the common cold) or those that make up his liver (in the case of the hepatitis virus). This specificity of damage by a virus accounts for the nature of the symptoms of each virus disease: where the virus destroys cells, there the signs of illness appear. If the virus destroys the tissues of a vital organ, one that man cannot live without, as rabies destroys the cells of the brain, then death is sure to result.

Viruses and the Human Immune System

Man, of course, like many of his animal cousins, is not entirely helpless in the face of every virus that comes along. He has several automatic body mechanisms that help stave off the continual onslaughts of viruses (and other microorganisms). The principal one of these is the immune system, by which the body is enabled to detect a foreign invader, such as a virus, and prepare a defense against it. The defense consists of antibodies, chemical substances in the blood and on the surfaces of certain cells, that recognize the invader and combine with it in ways that render it harmless.

Once a person has gotten over an attack of a typical virus disease, the antibodies remain in his blood for life and prevent the virus from ever again gaining a foothold in that person's body. In such cases we say that the person is "immune." Physicians have learned how to give people artificial immunity to many diseases without their having to experience them. This is accomplished with doses of a vaccine prepared from killed or altered viruses of the kind that cause the disease.

The immune system is a most effective way of combating viruses, but many viruses have found a way of getting around it. They simply mutate, change their form in such a fashion that the antibodies the body produces are no longer effective. This is what the influenza virus does; every few years a new form of the virus comes along, and most of the people who have already developed immunity to the old virus now find themselves susceptible to the new one. (And all the vaccines prepared to make people immune to the old virus are no good against the new one.)

Even the most lethal viruses cannot be that lethal, or we would not be around to talk about them. Viruses have learned to live with us, and we with them - in some degree of mutual toleration. But that does not mean viruses will not continue to mutate and attempt new ways of attacking their hosts, nor that these hosts (man included) will not continue to think up new ways of killing viruses.

from Locke, D.M. Viruses - The Smallest Enemy. NY: Crown, 1974, p. 1 - 6

WINDS OF THE WORLD

To the ordinary man, wind may be many things - a balm or a scourge, an annoyance or a blessing. But to the meteorologist, it is air in motion. As such, it is energy. It streams in silent rivers across the sky, surges in invisible cataracts over mountain ridges, boils heavenward over hot deserts and humid rain forests, swirls in furious, catastrophic maelstroms over Kansas, and the Caribbean and China Seas. It is power of cosmic magnitude. Scientists have estimated that if all the earth's atmosphere were moving at a leisurely 20 miles per hour - the speed of a light breeze - its energy at any one moment would equal the energy generated by the Hoover Dam operating at full capacity, night and day, for 6,680 years.

The wind energy performs prodigious tasks - tasks essential to the maintenance of the atmosphere's activities. It fills the sky with clouds, then sweeps it clear again. It drives the cooling, moisture-laden fogs in off the sea. It blows entire storm systems halfway around the world, moving heat and moisture from one region of the earth to another. It air-conditions and ventilates cities that lie along great bodies of water, like San Francisco and Chicago. It helps to push the ocean currents on their global journeys. It sculptures sand and snow, scatters seeds and spores. It clears the heavens of the poisonous exhalations of our machines and factories.

What Makes the Wind Blow?

What makes the wind blow? And why does it blow first this way, then that - now weak, now strong? The answer is, uneven atmospheric pressure. Because there are always differences in the temperature of the atmosphere, there are also pressure differences, and these differences naturally seek to balance themselves. High-pressure air in a child's balloon, when released, rushes outward to join low-pressure air. Air under 30 pounds of pressure in a tire may, if the tire has a weak spot, burst through to meet the average 14.7-pound pressure of the surrounding atmosphere. Similarly, wind movement is caused by the forces acting to push air from higher to lower pressure.

Men always guessed - and later knew - that the wind carried messages about future weather. Wind out of one quarter meant fair weather, wind out of another, storms. And so they watched the way trees bent, the way smoke drifted. They wet a finger and held it up; the cool side faced the wind. In ancient times, as today, the wind was named for the direction from which it blew.

Today the methods of linking the wind and weather are somewhat more complicated. Forecasters want to know first what the barometer is doing, and only then which way the wind is blowing. Once these facts are in hand, however, their matter-of-fact prose bears out the findings of the ancients. "When the wind sets in from points between south and southeast and the barometer falls steadily," reads the U.S. Weather Bureau's Weather Forecasting (1963 edition), "a storm is approaching from the west or northwest, and its center will pass near or north of the observer within 12 to 24 hours, with the wind shifting to northwest by way of south and southwest..."

Ways of Measuring Wind

The wind's usefulness as an aid to weather forecasting led men to devise all sorts of systems and gadgets for studying it. Primitive weathermen of China and Egypt built wind vanes that showed the directions from which the wind was blowing. In 17th Century Europe, in the earliest days of modern meteorology, scientists measured the speed and force of wind by setting feathers adrift in it and watching their passage between two points. Or they measured the speed at which the wind blew a feather cork disk along a wire. Sometimes they clocked the velocity of cloud shadows across a stretch of water or an open field.

By the mid-19th Century scientists were measuring the velocity of the wind by noting the rate at which it evaporated or cooled water. And one experimenter - presumably with perfect pitch - even used a device resembling wind chimes, rating the wind's speed according to the musical sounds it produced. About the same period, science hit upon the instrument that, in improved form is still widely used today to measure wind velocity: the cup anemometer. A modern anemometer consists of three or four cups mounted at the end of horizontal arms that extend at right angles from a vertical shaft. The wind catches the cups, spinning them around and rotates the shaft. The shaft is geared to a device that, like an automobile speedometer, registers the rate of revolution in terms of miles per hour.

But the complicated methods of modern forecasting require vast amounts of information - far more than the ground-level data that wind vanes and anemometers supply. In the Western Hemisphere alone, 145 U.S. Weather Bureau stations send up more than 600,000 balloons a year to gather information on the upper atmosphere. At least 120,000 of them are sounding balloons, from each of which dangles a tiny electronic device called a radiosonde (sonde is French for "sounding line"). The radiosonde combines meteorological sensing equipment with a radio transmitter. As the balloon drifts aloft, rising at about 1,000 feet a minute, it sends back continuous reports on temperature, pressure and humidity until it rises to somewhere between 75,000 and 125,000 feet - where it bursts. Sometimes, additional information is supplied by electronic direction-finders on the ground, which gather data on wind speed and direction by following the same balloon's path and speed by radar.

These investigations and others like them - made possible primarily as a result of the technological developments since World War II - have confirmed some heretofore unprovable theories, answered some once unanswerable questions and settled some old arguments. They have also cast doubt upon some long-accepted points of view, a few of them quite basic. Nevertheless, much is known about the winds - how they are formed, and how and why they blow.

How Sea Breezes Are Formed

The sea breeze and the land breeze are caused by the difference in the temperature of the air over the land and water. During the day, the sun warms the land, and the land warms the air above it. The air rises, and cool, heavier air flows in off the sea to take its place. During the night, the process is reversed: the sea, retaining much of its daytime warmth, warms the air over it, which rises and is replaced by heavier, cooler air blowing off the land.

The sea breeze and its nocturnal opposite appear with virtually clock-like regularity along the coastlines of the tropics and subtropics. The hotter the climate, the faster and farther these breezes move, and the greater their mass. They always reach their maximum speed at the hottest time of the day. In the temperate zones this top speed is a mild eight to 12 miles per hour; in the tropics it is a brisk 20 to 24 miles per hour. Their inland range in temperate zones is a mere nine or 10 miles, and their ceiling averages about 600 to 700 feet. But in the tropics the sea breeze extends 100 miles inland, and can have a ceiling of 4,000 feet or more.

The Wind That Overturns Rocks

The famous French mistral is a chilly wind that drains off the plateau of central France. Cold, dry, bleak and relentless, it blows south from Burgundy in the spring and autumn, funnels down the narrow corridor of the Rhone Valley, then sweeps across Provence to the Gulf of Lions. "An impetuous and terrible wind," wrote the Greek geographer Strabo in the First Century A.D., "which displaces rocks, hurls men from their chariots, crushes their limbs, and strips them of their clothes and arms ..."

Two thousand years have failed to mellow the mistral. To this day, it can still blow a man off a horse, upset a carload of hay and shatter windows with a blast of pebbles. In Arles, the mistral once nudged loose a string of engineless freight cars and blew them 25 miles to Port-St. Louis before trainmen could board them and brake them to a stop.

The Wild Winds - Cyclones, Anticyclones and Hurricanes

Most of the northern temperate zone's changeable weather originates along the undulating line where the polar easterly winds and prevailing westerly winds meet. The clash of the two currents, with their different temperatures and humidities, creates a more or less permanent condition of atmospheric instability and perturbation; great eddies and vortices form sporadically, to move off as isolated masses of whirling wind within the general circulation. Unlike the general circulation, however, these wind systems rise and subside, are born and die - in short, are episodic. To meteorologists they are known as cyclones and anti-cyclones, and one is a mirror image of the other. Cyclonic wind systems spin around a center of low pressure and converge upon that center, rotating counterclockwise in the Northern Hemisphere, clockwise in the Southern Hemisphere. Anticyclonic winds rotate in the reverse direction, around a high-pressure center, and flare out from the center. But both systems are alike in one respect: they cover areas of hundreds of thousands of square miles.

Cyclones are the familiar low-pressure areas of the weather map, the bringers of bad weather - clouds, rainstorms, blizzards. But they are not synonymous with the violent windstorms so often and mistakenly associated with their name: tornadoes are not cyclones. Anticyclones are the weather map's high-pressure areas and normally bring good weather. Together, highs and lows account for the temperate zone's variable day-to-day weather. Moving around the globe west to east, in endless and erratic procession, they bring clear skies and searing droughts, gentle rains and tempestuous 50-mile-an-hour gales.

In the tropics a low-pressure area can grow into the churning aerial maelstrom of a typhoon or hurricane - two names for the same kind of storm. Both are born over warm tropical seas, where the air is laden with moisture and heavily charged with latent heat energy. The hurricane, from "huracan," the West Indian god of storms, sweeps in from the Atlantic about 10 times a year, roughly between the months of May and September. The typhoon, which generally makes its appearance in August and September but can occur in any season, blows up on an average of 20 times a year in the North Pacific alone. During their violent lives these tropical storms can do incredible damage.

Most vicious and capricious of all storms, however, is the tornado, a traveling whirlwind whose name comes from the Spanish "tronada" - thunderstorm.

The Twisters of the U.S.

Tornadoes occur in many parts of the world, but nowhere do they occur with more frequency and violence than in the United States, where each year 500 to 600 of them rip their way across the countryside. Most of them occur during the afternoon, shortly after the passing of the day's highest heat, and they are always associated with thunderstorms. Green lightning flickers weirdly over the land, and dark clouds glow strangely green and yellow. They are accompanied by a sullen, remote rumble which sounds at close range like the roar of a thousand express trains traveling at top speed.

The average tornado has a central core perhaps 250 yards in diameter and may travel along the ground only 100 feet, but can go 100 miles. It usually appears as a funnel-shaped cloud, but sometimes it is a relatively straight-sided cylinder, a thin, curiously twisted rope or an elephant's trunk swinging across the eerily lit countryside.

As the tornado advances it scoops up and spews out timbers, trees, livestock, rocks, refrigerators, rooftops, cars, chickens. Even people have been carried aloft by tornadoes. In Texas, in 1947, two men were carried 200 feet by a tornado and were then set down virtually uninjured. During another tornado, a man and his wife in Ponca City, Oklahoma, were inside their house when it was blown away; its walls and roof exploded, but the floor remained intact and eventually glided back to earth, depositing the couple unharmed.

The top speed of a tornado's whirlwind has never been measured; the instruments never survive. Meteorologists think it probably reaches about 400 miles per hour, and may go as high as 600 or 700 miles an hour - approaching the speed of sound. In its wake it leaves some weird testaments to its power. One tornado in 1925 drove a large plank into the trunk of a tree, wedging it firmly enough to support the weight of a man on its free end. And tornadoes regularly denude chickens of their feathers - usually, but not always, doing in the chickens as well. Terrifying and unforgettable, and intrinsically baffling, the tornado is the briefest but most intense of all the many kinds of winds that swirl in endless convolutions above the surface of the earth.

from Thompson, P. & O'Brien, R. (Eds.) <u>Weather</u>. NY: Time-Life Books, 1968, pp. 57-66

APPENDIX B

VERBATIM TRANSCRIPTS OF TRAINING SESSIONS

Training Session I

I. Overall description of training program (5 minutes)

As you may have guessed from the questionnaires you filled out the last time, the purpose of our project is to look at the relationship between college students' study habits and personality characteristics. What we'll be doing in our session today and in the next two sessions you'll be attending is teaching you a study method that we feel will be effective in helping students improve their study habits and, consequently, their grades as well. This method we have called SPAR (write on board). Each letter of the word SPAR stands for a particular part of the overall method. S is for Survey, P is for Processing Meaningfully, A is for Asking Questions, and R is for Reviewing and Self-Testing (write each under appropriate letter). In today's session and in the next two we'll be teaching you about these various components and asking you to apply them to passages we'll hand out. After the last training session (Green session) you'll know all the components, and then we'll ask you to use the entire method to help you prepare for your next exam in your Psychology class and we'll give you a credit for doing that. To remind you of the procedure again, you'll attend three training sessions over the next two weeks, a Red Session, which is today's a Blue Session, which you'll sign up for before you leave today, and a Green Session, which you'll sign up for next time. At each of these sessions, we'll explain different components of the SPAR method, so it's important that you attend all three sessions. Are there any questions about the procedures for the next sessions?

II. Survey (5 minutes)

The first component of the SPAR method is called Surveying. This means scanning a chapter or a passage before you actually read it in order to get an idea of what's to come. It's similar to watching the "Coming Attractions" at the movies - it gives you an idea of some of the highlights of a movie so you'll know what to expect when you actually go to see it.

You may ask why surveying is so important. I'm going to show you a short passage and ask you to read it and then I'll ask you about it. (Show slide 1 and tape.) Allow about two minutes then ask - Does anyone know what this passage means? Now show slide 2. Knowing what the passage would be about before you'd begun to read it would have helped tremendously. <u>This</u> is why surveying is necessary. Reading without surveying first may provide at best an incomplete picture of what's going on at at worst a distorted one.

The <u>goal</u> of surveying is to be able to answer the question, "What am I about to learn?"

III. Process Meaningfully (10 minutes)

The second component of the SPAR method that we'll talk about today is processing meaningfully. This step involves actually reading the material but doing so in a way that may be different from the way many people read. That is, there are ways of thinking about the material <u>while</u> you're reading it that will allow you to get more meaning from it and, therefore, will let you remember it better when you're preparing for an exam. Now we'll talk about five different ways of processing meaningfully while you're reading:

1. The first is to associate the new material you're reading with something from your own personal experience. The following example will illustrate this technique. (Show slide and run tape.)

2. The next technique that we'll talk about for processing deeply is to put the material you're reading in your own words, like this: (Show slide and run tape.)

3. Another technique you can use to process deeply is to create an image or picture in your mind of what you're reading. Just try to imagine how it would look if it were on TV in front of you, like the lady does in the following example: (Show slide and play tape.)

4. Another technique you can use to process deeply is to associate the material you're reading with something that you already know. Try to see similarities between the new material and something with which you're already familiar, like the student does in this example: (Slide and tape.)

5. The final technique we'll talk about today for processing material in a meaningful way is to think of real-life applications for the new concepts you read.

Try to think of how something you're reading could apply to your own life experiences, or something you're planning for the future, as in the following example: (Slide and tape.)

So now we've gone over five different ways in which you can think about the material you're reading so that you'll be able to process it more meaningfully. You don't need to use all of these strategies every time you read, but can choose one or two that seem to be most relevant and most appropriate for you. In order for you to practice using them, let's look at the following passage and talk about which of the strategies above might be most helpful. (Show slide and allow about two minutes.) (After two minutes say) Now look through the list of five techniques we've talked about today and pick one that you think might be a good one to use in trying to remember the main points in this paragraph. Which one did you choose? How did you use it? (ask one student)

IV. Testing

Now I'm going to hand out some passages that are about five pages long. I'd like you to read the passage using the two components of the SPAR method that we've discussed today - Surveying and Processing Meaningfully. After you've finished reading I'm going to be asking you some questions about what you read in the passage. When you receive your passage, the first thing to do is to read the title, and then all the sub-headings. Next, begin to read the text and as you're reading, try to make use of one or more of the techniques we just discussed for processing meaningfully. When you're finished reading, come up and I'll give you the questions on the passage - ten multiple choice and ten fill-ins. Finally, before you leave today, please sign up for the Blue Session to be held next week. The sign-up sheets are here. Any questions? (hand out passages in randomized order)

I. Review of Surveying and Processing Meaningfully (5 minutes)

Before we begin talking about the third component of the SPAR method, Asking Questions, let's review briefly the two components we talked about last time in the Red Session, Surveying and Processing Meaningfully. The goal of Surveying a passage is to answer the question, "What am I about to learn?" You should read the title of the passage, introduction, table to contents (if there is one), all the sub-headings and bold-faced or italicized terms before you actually begin to read the text. Once you do begin reading, Processing Meaningfully will allow you to understand better what you're reading and to remember it better when preparing for exams. Some strategies that we talked about last time for processing meaningfully are: 1) associating the new material with something from your own personal experience, 2) putting the new material in your own words, 3) creating a picture in your mind of what you're reading, 4) associating the new material with something you already know, and 5) thinking of real-life applications for the new concepts you read. Today, we'll move on to the third component of the SPAR method, Asking Questions to yourself about what you're reading.

II. Asking Questions (15 minutes)

A. Qualities of a good question

When making up questions about what you're reading, it's important to remember that not all questions are created equal with respect to their ability to help you organize and remember material. Some questions are better and more effective than others. Now we'll talk about the qualities of a good question. (Show slide with passage and four questions below.) Read this passage and the questions below it.

1. Not too general. The first quality of a good question is that it not be too broad or general. Read Question #1. Overly broad questions like this generally do not allow you to make distinctions between concepts that may have certain features in common. There may be very subtle differences between two concepts and questions that are too general will not help you get a complete understanding of these differences.

2. Not too specific. The next important quality of a good question is that it not be too specific. Now look at Question #2. Questions like #2 might give you information about a particular detail in a passage you're reading, but they generally won't give you any information about how that detail fits into an overall understanding of a concept.

3. Relevant to passage. The third important quality of a good question is that it be relevant to the topic of the passage. Look at Question #3. It doesn't seem to be too general or too specific, but it asks for information that is largely irrelevant to the main point of the passage. A question may be good otherwise, but if it's not relevant to the passage, it won't be helpful.

4. Example of a good question. Finally, look at Question #4. This question seems to have the appropriate degree of generality, specificity, and relevance to the paragraph in order to be helpful in understanding and remembering the material.

5. Similar to those asked by professor on exams. The most important quality of the questions you make up to ask yourself is that they be similar to the kind of questions your professor tends to ask on exams. Looking at previous exams, try to anticipate what questions will be on the next exam. Try to "outguess" the professor by deciding what kind of question he/she tends to ask and asking questions like that of yourself while studying.

B. A word on test construction - a good test usually contains some items that everyone will get right, some that most people will get right, some that most people won't get right and some that very few people will get right. The latter kind of items will probably seem "picky" or very specific according to our discussion earlier. It is probably unrealistic to attempt to anticipate all of these very specific items with questions you make up, but other categories are certainly possible and as you study from these other kinds of questions, you will pick up much of the very "picky" information.

C. Identifying good and poor questions. Now I'd like to see how good you are at picking out appropriate questions. (Hand out passage with five questions below.) Read this passage and the five questions below. Beside each question, indicate whether you think that question is too general (G), too specific (S), irrelevant to the passage (I), or appropriate (A).

D. How many questions to make up? This will vary with the type of passage and the writing style of the author, but a good rule of thumb is to use the chapter headings and sub-headings as a guide and turn them into questions. For example, a good question for a passage with a sub-heading of "Women's Suffrage - Effects on the Economy" might be "How did women's suffrage affect the economy?"

II. Test (30 minutes)

Now we're going to see how well you can make up questions on your own. I'm going to hand out a passage and I'd like you to use the Survey and Processing steps that we went over the last time, as well as Making up questions from the sub-headings in the passage and writing them down on this sheet. So, first you'll Survey, reading the chapter title and sub-headings, then you'll read the passage once, using some of the strategies we discussed for Processing Meaningfully, and finally you'll jot down about 5-6 questions (roughly one per chapter heading). When you've done these three things, bring your passage and your question sheet up and I'll give you <u>our</u> questions, same format as before - 10 multiple choice and 10 fill-ins. Finally, before you leave, don't forget to sign up for the final training session, the Green Session, to be held later this week.

Training Session III

I. Review of Survey, Processing Meaningfully and Asking Questions (5 minutes)

Today we'll talk about the last component of the SPAR method, Reviewing and Self-Testing. Before we do that, though, I'd like to review briefly the first three steps - Surveying, Processing Meaningfully and Asking Questions. We know that the goal of Surveying is to answer the question, "What am I about to learn?" Surveying is done by reading the chapter title, sub-headings, introduction and table of contents if there is one, before you begin to actually read the text of the passage. After you have Surveyed and begin to read, there are several techniques that you can use to process the material in a meaningful way. Some of the ones we reviewed are: 1) associating new material with something from personal experience, 2) putting new concepts in your own words, 3) creating a picture in your mind of what you're reading, 4) associating new material with something already known, and 5) thinking of real-life applications for the concepts you study. At our last session we talked about the third component of the SPAR method - Asking Questions. We said that a good question should be not too general, not too specific and should be relevant to the topic of the passage. Most importantly, a question you make up should be the kind asked by your professor on exams. Today we'll talk about the last component of the SPAR method - Reviewing and Self-Testing

II. Reviewing (10 minutes)

The process of reviewing is really pretty simple - all it involves is answering the questions you made up in the previous step. However, this sometimes is not as easy as you might think. It's important to distinguish between a completely right and a partially right answer. For example, read this passage (show slide with passage and question underneath). The question below is one that was made up by a student to test himself on this paragraph. Read the question and the answer and decide if the question is answered completely or partially.

Now I'd like to see if you can actually use the information about answering questions completely on your own questions. I'm going to hand back the questions you made up last week and the passages you worked on, and I'd like you to write down the answer to each question you made up last week, paying attention to completeness and correctness.

One final point about reviewing - there should be some time between steps 3 and 4 of SPAR. That is, you shouldn't read the passage, write down questions, then immediately answer them. You should finish making up the questions one night, then the next night sit down and try to answer them. Allow some time to elapse between when you make up the questions and when you try to answer them.

III. Self-testing (two minutes)

Finally, before you end your studying for an exam you should test yourself. To do this, close all your books, notes, etc. and ask yourself each question, checking each answer with the correct one. Repeat this process until all questions are answered correctly from memory.

IV. Testing (30 minutes)

Now I'd like to see how well you can apply all four of the steps of the SPAR method. I'm going to hand out a passage and, beginning with the Survey phase, use each of the four steps we've discussed. After you survey, read the passage using some of the techniques for processing meaningfully that we talked about in the first session. When you've read it once, go back and make up one question per heading and answer it. Write your questions and answers on this sheet. When you've finished making up and answering your questions, bring them up here and get the test on this passage - same format as before - 10 multiple choice and 10 fill-ins.

Finally, you may remember from the very first time you came to participate in this Experiment that I said I would explain how you went about earning your 6th experimental credit from this experiment. Well, what we'd like you to do is to use the SPAR method to prepare for your upcoming exam in your Psychology class. We'd like you to use the four steps you've learned in this experiment while you're studying for your Psychology exam on Friday, November . You'll use Surveying, Processing Meaningfully, Asking Questions and Reviewing while you're reading your Psychology test book. In order to get a credit (your 6th one) we'd like you to turn in the questions you make up for Chapter 12 only, to me on the day of your exam. I will come to class that day and collect questions from people who have participated in this experiment.

All those people who hand in questions will receive the 6th credit. If you don't hand in questions that day for Chapter   , you'll receive only five credits. So, now when I hand out this passage you'll use all four steps in the SPAR method, and next week when you're studying for your Psychology exam, you'll do the same thing. You can take these bookmarks with you and keep them in your Psychology book to refer to as you're studying. Any questions?

APPENDIX C

I, the undersigned, hereby grant permission for Kathleen M. Rusch to have access to the scores on my ACT exams that I took prior to entering Loyola.

Signed____Date_______________

*Content form for access to ACT scores

December 7, 1982

Dear Psychology Student:

As you probably recall, you participated in a Psychology experiment this semester in which you were taught a study skills method called the SPAR approach. You earned six extra credit points (the total number required for your General Psychology course) by participating in this experiment, including one credit for applying the SPAR method to your studying for your third exam in your Psychology class. The formal part of the experiment is now complete and all your credits have been awarded. However, I am interested in looking at the ways in which the SPAR method might be helpful to students in preparing for their final exam in the Psychology course. It is felt that the SPAR method, when properly applied, can help students improve their study habits. I would encourage you to use the SPAR method in studying for your final exam even though I can no longer award you any extra credit points for doing so. If you do decide to use SPAR in studying for your final, I would ask you to put the questions you make up for Chapter 8 (pp. 340 - 383) and the answers to these questions in the enclosed envelope and drop it off in the box outside my office (DH 619) in the day of your Psychology final or shortly after. Again, you will receive no extra credits for studying for your final in this way. Using SPAR to help you prepare for your final will be strictly for the purpose of improving your own study habits and possibly, your grade as well.

If you have any questions about this or any part of the experiment, please contact me (X 3018) or leave a message and I'll get in touch with you.

Thank you again for your cooperation,

Kathy Rusch

*Letter to Students in Training Group

APPENDIX D

ACHIEVEMENT-TYPE TESTS TAKEN BY CONTROLS

Spelling Test
(the following words were dictated via audiotape)

1. sophisticated
2. advocacy
3. unique
4. kindergarten
5. aptitude
6. idiosyncracy
7. controversy
8. homogeneous
9. spatial
10. amnesia
11. commitment
12. affiliation
13. physiological
14. excessive
15. distractibility
16. fatigue
17. achievement
18. abstinence
19 questionnaire
20. rendezvous
21. neurological
22 ingenious
23 acoustic
24. transferred
25. hypnosis
26. retrieval
27. exhaustive
28. simultaneous
29. alphabetically
30. anecdotal
31. spontaneous
32. superstitious
33. aggressive
34. extinction
35. phenomenon
36. muscle
37. anonymous
38. caffeine
39. correlation
40. psychiatrist

*N.B. The Reading Comprehension test employed is published by Educational Testing Service, Princeton, NJ (1978)

Vocabulary Test

(Subjects were required to encircle the word which meant the same as the underlined word)

1. turbulence: a) agitation b) noise c) swelling d) calm

2. susceptible: a) sticky b) perfectionistic c) contagious d) sensitive

3. utilitarian: a) philosophical b) obsolete c) practical d) optimistic

4. contingency: a) necessity b) boundary c) an event dependent upon another d) satisfied state

5. soliloquy: a) theater b) monologue c) dance d) dialogue

6. fabricate: a) assemble b) sew c) attempt d) investigate

7. pseudonum: a) elf b) illness c) alias d) small bird

8. voracious: a) quick b) indiscriminate c) absolute d) ravenous

9. stringent: a) lenient b) severe c) punishing d) fastened with strings

10. mnemonics: a) foreign languages b) dramatic moments c) military assistants d) memory aids

11. inference: a) deduction b) butting in c) hindrance d) obstacle

12. assessment: a) estimation b) tax c) plan d) report

13. tactile: a) tough b) considerate c) discreet d) pertaining to the sense of touch

14. subliminal: a) transformed b) beneath one's level of awareness c) majestic d) instinctive

15. olfaction: a) division into sections b) government by a few c) sense of smell d) monopoly

16. ubiquitous: a) sloppy b) unreal c) omnipresent d) modern

17. malady: a) girlfriend b) nonsense c) construction d) illness

18. dilate: a) expand b) explain c) narrate d) shrink

19. facilitative: a) special b) easy c) difficult d) able

20. transcend: a) meditate b) perform c) rise above d) copy

APPROVAL SHEET

The dissertation submitted by Kathleen M. Rusch has been read and approved by the following committee:

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Associate Professor, Psychology, Loyola

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

11/12/84
Date

Director's Signature