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## Effects of Feedback and Incentives on the Use of Academic Skills

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EFFECTS OF FEEDBACK AND INCENTIVES  
ON THE USE OF ACADEMIC SKILLS

by

Jose E. Candia

A Thesis  
Submitted to the  
Faculty of The Graduate College  
in partial fulfillment of the  
requirements for the  
Degree of Master of Arts  
Department of Psychology

Western Michigan University  
Kalamazoo, Michigan  
December 1986

EFFECTS OF FEEDBACK AND INCENTIVES  
ON THE USE OF ACADEMIC SKILLS

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This research investigates the notion that the combination of feedback and incentives are essential components for the maintenance of effective academic skills with undergraduate students on academic probation. This notion is in contradiction to the assumption underlying remedial activities in most universities, where it is assumed that once the students have acquired the skills through workshops or texts they will continue to use them.

The use of the academic skills of lecture note-taking, comprehensive reading, and critical reading was studied with three undergraduate students. That use was measured prior to the intervention, during workshops of training, when feedback alone was implemented, and when a combination of feedback and incentives were added. Each successive condition showed an increase in the use of those skills, but the level was quite low under all the conditions until incentives were added.

## ACKNOWLEDGEMENTS

Several persons contributed to the completion of this study. I am greatly indebted to Dr. Richard W. Malott who provided his advice, expertise, support and friendship. I am especially grateful to Brian Yancey for his continual supervision, encouragement, and patience. My gratitude must be extended to Dr. Dale Brethower and Dr. Jack Michael for their incisive comments. A special thanks to my friend, Carol Scarberry, who gave me her support when it was most needed. Without their assistance, I would not have been able to conduct this research.

I dedicate this work to my mother, Mary, to my wife, Ana Maria, and to my children, Valeria and Viviana, who shared with me the difficulties of this long-run goal.

Jose E. Candia

## TABLE OF CONTENTS

ACKNOWLEDGEMENTS .....	ii
LIST OF TABLES .....	v
LIST OF FIGURES .....	vi
CHAPTER	
I. INTRODUCTION .....	1
Some Plausible Reasons for Student Underachievement.....	2
II. METHOD .....	5
Subjects and Setting .....	5
Subjects .....	5
Setting .....	5
Materials .....	6
Procedures .....	7
Dependent Variables .....	7
Observation and Scoring Procedures of the Dependent Variables .....	9
Experimental Design .....	10
Baseline .....	10
Independent Variables .....	10
III. RESULTS .....	15
IV. DISCUSSION .....	18

Table of Contents--Continued

APPENDICES .....	21
A. Forms Used by the Study.....	22
B. Forms Used in the Center for the Self- Management of Academic Performance .....	27
BIBLIOGRAPHY .....	30

## LIST OF TABLES

1. Different Phases for the Academic Skills by Weeks .....	12
2. The Intrasubject Comparison and Differences of the Semester GPAs and Cumulative GPAs .....	16
3. Degrees of Reading Power Under Pretest and Posttest Conditions and Their Differences .....	16

## LIST OF FIGURES

1. Group Performance and Individual Performances vs.  
Kind of Academic Skills. The Horizontal Dotted  
Line Represents the Median Performance ..... 17

## CHAPTER I

### INTRODUCTION

In the last several years at many universities and colleges, attempts have been made to improve undergraduate students' academic performance. These attempts concentrated on teaching students appropriate behaviors to be performed in classes, behaviors such as lecture note-taking, and test-taking (Beard, 1976, chap. 4; Dean, 1978; Mercier & Ladouceur, 1983). In addition, attempts have been made to improve undergraduate students' academic performance by teaching them behaviors to be performed out of classes such as comprehensive reading and critical reading, writing, and self-management (Bristol & Sloane, 1974; Cohen et al., 1970; Jager, 1984; Robinson, 1941; Walter & Siebert, 1984, chap. 6). In all, many workshops, training programs, and programmed textbooks, have been developed to increase the academic performance of the undergraduate student.

Similarly, behavioral approaches, using operant and cognitive behavioral principles (McMillan, 1977), have been widely applied in higher education, in an attempt to improve the academic performance of undergraduate students. These behavioral principles have been used with behaviors performed in classes as well as out of classes. Behavior modifiers have demonstrated the effectiveness of self-monitoring and self-recording (Champlin & Karoly, 1975; Miller & Gimpl, 1972), stimulus control and self-reinforcement (Greiner &

Karoly, 1976; Richards, McReynolds, Holt & Sexton, 1976), contingency contracting and test performance (Bristol & Sloane, 1974), packages of behavioral techniques related mainly to self-management (Dean, Malott, & Fulton, 1983; Dillon, Kent & Malott, 1980; Gant, Dillon & Malott, 1984; Jager, 1984; Yancey, 1983), systematic desensitization (Harris & Johnson, 1980), and behavioral teaching techniques (Johnston & Pennypacker, 1971; Keller, 1968; Malott & Svinivki, 1969). There are also interesting efforts in teaching students to learn to think, so they can use this skill while performing academically (Heiman, 1984).

The present study falls in this behavioral tradition, combining the training of academic skills with the maintenance of the usage of those skills through an incentive-based performance-management system.

#### Some Plausible Reasons for Student Underachievement

Several factors may account for low academic performance. One factor is that inherent reinforcers for studying are often weak and infrequent; therefore, rewards for studying do not compete effectively with the rewards for other activities (Michael, 1974). This is because reinforcers for many behaviors incompatible with studying are usually numerous and immediately available, and in contrast, the consequences for studying are small and of only cumulative significance (Malott, 1980). For example, test scores and feedback are usually too delayed or vague to serve as behavioral consequences (rewarding and aversive outcomes) for studying (Abrams & Jeringan,

1984; Haemmerlie, 1985; Malott, Tillema & Glenn, 1978, pp. 257). Because of ineffective behavioral consequences, students tend to procrastinate and therefore obtain low grades (Ziesat & Rosenthal, 1978). On the other hand, much of the student's time goes into "getting ready to study," a set of activities very difficult to discriminate from procrastinating. And much time goes into "reading the assignment," an activity that is vastly different from "comprehending the assigned material" (D. M. Brethower, 1982).

Most behavioral studies make more frequent use of added and explicit behavioral consequences than is normally the case for studying under typical conditions. But a more comprehensive approach may be needed. It may be necessary to teach effective learning skills (Walter & Siebert, 1984), as well as to increase the density of added rewards. This is because many students do not have the skills they need to succeed in their studies, skills such as comprehensive and critical reading, effective note-taking, effective self-management, and others. So, there are two factors that should be considered when attempting to improve a student's academic performance. They are behavioral consequences for studying and academic skills. Many students know how to study and learn, but they do not have the appropriate behavioral consequences for doing so. On the other hand, students with poor academic skills may have such a low frequency of reinforcement for academic performance that the behavior has essentially extinguished. In these cases, it may be especially necessary to add behavioral consequences to support academic behaviors, even though academic success itself would be a

powerful reinforcer if it were attainable. Although there have been many programs designed to either improve academic skills, or to increase the involvement of effective behavioral consequences, most of these efforts did not consider their interrelatedness. To the knowledge of the experimenter, there are no published data on the actual use of academic skills. There seems to be no literature addressing the role of effective incentive systems in getting the students to use the academic skills once they have been acquired. The importance of combining effective incentive systems with academic skills training may be seen in the fact that it is very unlikely that students will participate in programs at university academic skills centers, even though these programs may provide them with important skills (Beard, 1976, chap. 4).

The present research examined the relationship between the behavioral consequences for making use of academic skills and the actual training of the skills. This research was an attempt to determine whether knowledge of the academic skills or feedback about the performance is enough, or whether there is also a need for added incentives, such as points and a time-off procedure, to insure that students apply the specific academic skills they had learned.

## CHAPTER II

### METHOD

#### Subjects and Setting

##### Subjects

The students selected for the present research were three undergraduates on academic probation. Those students were required to attend a one-credit course, Psychology 397, a self-management academic performance course, because their cumulative grade-point averages (GPAs) were below 2.0. The students' ages ranged from 18 to 22 years. Students S1 and S2 were females majoring in elementary education. Student S3 was a male, majoring in psychology. They participated on a voluntary basis in this research. In addition, they were chosen because they were enrolled in courses that required them to read text material and to take notes during lectures.

##### Setting

This research was conducted in the Center for the Self-Management of Academic Performance at Western Michigan University. The center had the following characteristics:

##### Study Center Attendance

The students were required to study two hours per day, from Monday to Thursday, in the center. They were required to produce six

flashcards on their study material for every hour they spent at the study center. They were quizzed daily or required to make examples for each card.

### Contracting System

The students had to meet weekly with their respective student-contractors. At these meetings, the contractor helped the student outline the study tasks for the next weekly meeting. The contractor determined and recorded the quality and quantity of the tasks and delivered points for the proofs of accomplishment on the student contract form (Appendices). These proofs of accomplishment consisted of items such as lecture notes meeting the criteria of the dependent variable and the student worksheet filled out properly. The contractor also could deliver bonus points if students completed extra tasks such as putting extra time in the study center, being tested on additional cards, making extra homework, and other activities. All total points were accumulated for the student's grade.

### Materials

The students in this experiment were trained in note-taking and comprehensive reading using a programmed text (Cohen, et al., 1970). In a separate workshop the students also were trained in critical reading, for using skills such as identifying the main idea(s) of the reading and stating opinions about the readings. The training was done in a special workshop implemented in the Academic Skills Center, at Western Michigan University, using materials developed in that

center as well as the student's own text materials. For each of the different skills taught, the study used a special form (Appendices).

## Procedures

### Dependent Variables

The dependent variable was the percentage of opportunities where the students used the academic skills as scored by the experimenter based on the proofs of accomplishment the students presented. Some of those skills were relatively trivial while others were more fundamental and perhaps more difficult to acquire.

Lecture Note-Taking. An acceptable set of lecture notes for one class lecture should have met each of the following criteria:

1. Page number
2. Course name
3. Date
4. At least one item in block format, that is, a space between separate ideas, and that space might be used later to add other information that the students might find.
5. At least two abbreviations.
6. At least one general question about the overall topic of the lecture.
7. At least six more detailed questions for each period of class (50 minutes), and preferably written on the left side of the page.
8. Enough information to answer the general question(s) and the

detailed ones.

9. A concrete instance or example about the topic for each period of class.

The first two criteria were applied only when notes were taken on loose leaf pages and not in a bound notebook. The first five criteria were considered trivial and were not analyzed extensively. Items 6 through 9 were considered fundamental and constituted the most important part of the dependent variable.

Comprehensive Reading. Using the student worksheet form (Appendices), the proofs of accomplishment should have met each of the following criteria:

1. The textbook title.
2. The chapter title.
3. At least one general question per chapter.
4. At least 50% of the total possible of key words or subheadings of the chapter.
5. At least one question for each one of the key words or subheadings.
6. Enough information to answer the questions about key words or subheadings.
7. Corrections in the answers for those that were wrong or incomplete.

The first two criteria were considered trivial and the remaining items were the fundamental ones.

Critical Reading. The non-trivial skills should have met each

of the following criteria:

1. The main idea(s) of the chapter written in the student's own words.
2. Facts supporting the main idea(s) located and written briefly.
3. Some inferences about the reading material written (a reasonable guess about the meaning and purpose of the author's message.)
4. A short opinion offered in a short paragraph regarding the author's basic assumption, if the author was biased, and whether or not the student agreed and why.

#### Observation and Scoring Procedures of the Dependent Variables

Once a week, during the weekly contract meetings, the experimenter observed and recorded the dependent variables according to the following procedures:

1. For lecture note-taking, a random lecture class was chosen each week and the lecture notes from this class were scored on the previously listed criteria. The meeting of each criterion was recorded as 1, while absence was recorded as 0.
2. For comprehensive and critical reading, the student worksheets and the additional notes the students took on their reading material were scored.

Interobserver agreement was used to assess the reliability of the measurement of the dependent variables. Second raters independently scored the notes and the worksheets of the students to observe

the presence or absence of each criterion point. The percentage of agreement (presence and absence of the components of the dependent variable) was calculated by dividing the number of agreements by the number of agreements plus the number of disagreements and this result was multiplied by 100. The secondary observers, who were the contractors for the students, checked 25% of the total number of sessions and the percentage of agreement was 85% for S1, and 90% for S2 and S3.

### Experimental Design

A multiple baseline across behaviors was employed to evaluate the experimental effects on three behaviors. These behaviors, which were previously defined in measurable terms, were lecture note-taking, comprehensive reading, and critical reading.

### Baseline

The proofs of accomplishment for these behaviors were observed during the first two weeks of the study (as Table 1, p. 12, shows) to determine the extent to which the students were using these or equivalent skills workshops where they were taught.

### Independent Variables

#### Workshops

As Table 1, p. 12, shows, the students were required to attend workshops to acquire the academic skills. The workshop on lecture note-taking consisted of two two-hour sessions once a week. The first

session was used for the purpose of having the students go through the section of note-taking of the text (Cohen et al., 1970, pp. 88-143). The experimenter provided additional assistance in order to complete the exercises of the programmed unit. The second session was concerned with providing the student with the opportunity to obtain only relevant information from short simulated lectures that the experimenter gave. In this session the students practiced formulating questions about the material developed.

The workshop on comprehensive reading consisted of two two-hour sessions once a week for three weeks. The first session and half of the second were used to go through the section on reading in the training text (Cohen et al., 1970, pp. 5-74). In the remaining sessions, the students practiced the skills they had learned using their own texts and filling out the student worksheet form. The experimenter supervised the students' practice and discussed ways in which their skills could increase.

The workshop on critical reading consisted of one one-hour session once a week for five weeks. In the workshop, which was developed by the coordinator of the program, a pretest and a posttest were administered to measure the critical reading levels. This occurred during the first and last session respectively. In the second session, a brief demonstration of the reading strategy was shown; and then students had the opportunity to apply the strategy to common reading selections. In the third and fourth sessions, the students practiced on their own reading materials, and group discussion was encouraged and directed to refine the appropriate critical

reading.

During all the workshop periods, data on the use of the skills were taken.

Experimenter Involvement. The programmed text, (Cohen et al., 1970), may be used as a completely self-instructional program; however, it should be emphasized that although the guidance of an instructor is not mandatory, this research used this alternative. The experimenter supervised and monitored the students' performance, as well as sometimes adapted the training to some particular needs of the individuals.

Table 1  
Different Phases for the Academic Skills  
by Weeks

Phases	Academic skills		
	Lecture Note-taking	Comprehensive Reading	Critical Reading
Baseline	1 - 2	1 - 2	1 - 2
Workshop	3 - 4	3 - 5	3 - 7
Feedback alone	5 - 9	6 - 10	8 - 11
Feedback & incentives	10 - 14	11 - 14	12 - 14

Feedback. During five weeks, feedback was given without using incentives for the use of lecture note-taking skills and comprehensive reading skills. For critical reading, this phase was implemented for four weeks. The feedback was oral and written and the

students knew specifically through this system if they were using properly the academic skills they were required to use.

Combination of Feedback and Incentives. Finally, the use of each of the skills was monitored by a combination of feedback and incentives.

The students earned 70 regular points at the Center for the Self-Management of Academic Performance. The regular points were for completing worksheets, updating their performance graphs, attending the study center, working on their performance contract, and attending the weekly meetings with their contractors. During the phase of incentives added to feedback, the students earned additional points for making use of the specific academic skills in their regular course work. The students earned 2 points for each non-trivial academic skill and 1 point for the trivial ones. Part of the regular Psychology 397 course requirements involved the study center attendance two hours a day, from Monday to Thursday. The students could get time off from the study center and those who were able to earn 25 incentive points obtained one day off, and those who earned 50 incentive points obtained two days off. These earned incentive points also counted toward the Psychology 397 grade.

In the weeks 2, 4, 8, and 12, reliability data were taken. The contractor for each student served as an independent observer for that student. These observers recorded the frequency of use of the academic skills and the proofs of accomplishment shown by the students.

During each of the 14 weeks of the study, a weekly meeting was held between the experimenter and each of the students in order to measure the use of the skills and provide feedback and incentives during the relevant phases.

## CHAPTER III

### RESULTS

Each intervention increased the use of academic skills. However, the addition of incentives produced the greatest increase. In the baseline phase, the median use of the academic skills was 3.50% for the combination of the three types of behaviors and for the three students. After the workshop that median was 10.5%. When feedback was added, the median of the scores was 28%. However, the largest improvement was when incentives were added to feedback producing a median of 66% as Figure 1 shows. Although only the measures of the non-trivial academic skills were used in the present analysis, the trivial academic skill measures showed the same results.

Increasing students' GPAs above 2.0 was not of immediate concern in this study, but some improvements were achieved for students S2 and S3. Student S1 did not achieve a better GPA due to a low grade in a mathematics course. In fact, the skills that this student had learned were irrelevant for that course. Individual results are summarized in Table 2, which compares the semester and the cumulative GPAs for the semester prior to the study and the one of the study.

Similarly, Table 3 shows the results of a test of levels of critical reading (Degrees of Reading Power). The test was administered at the beginning and again immediately after the training workshop. All three students showed a slight improvement.

Table 2

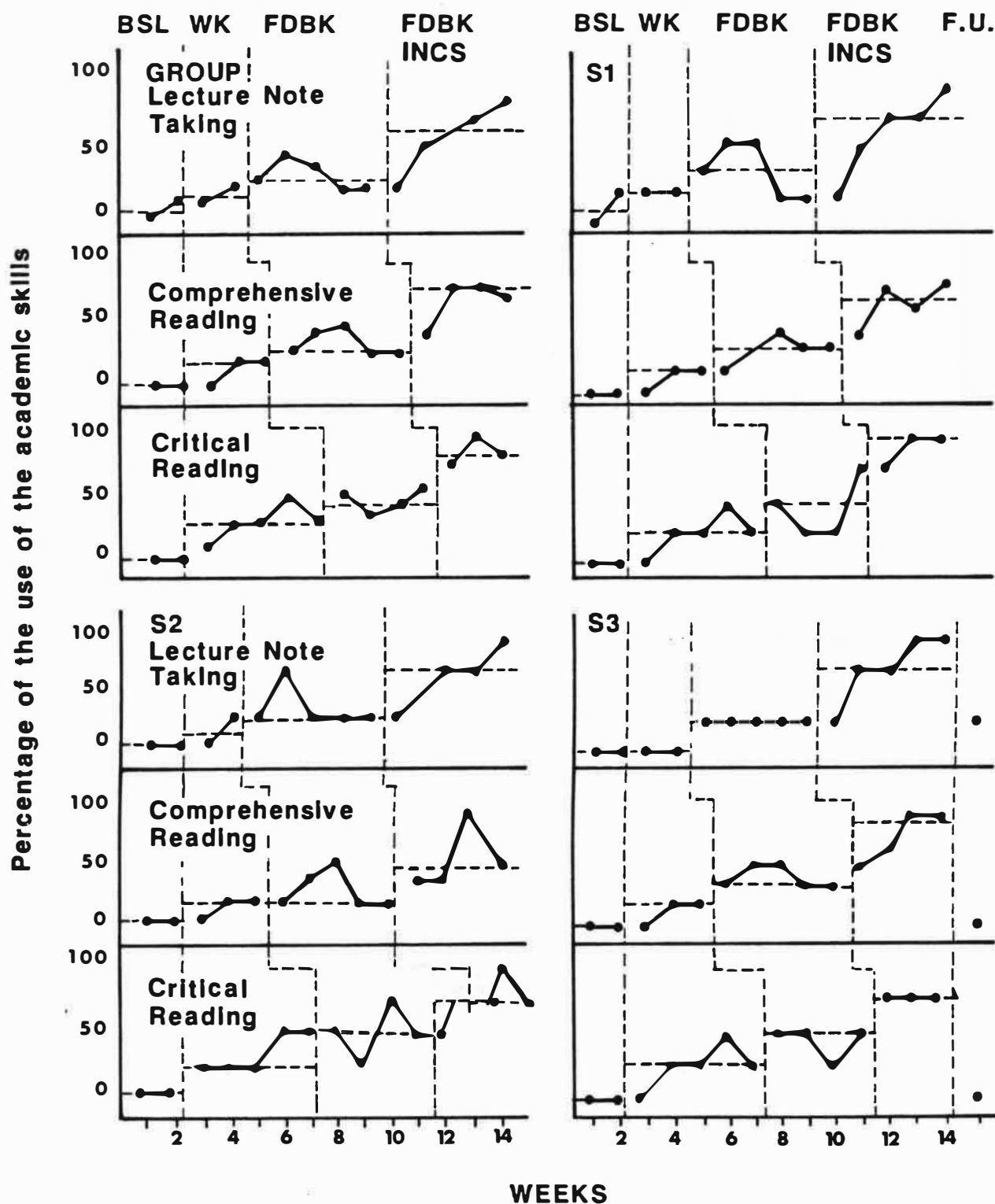
The Intrasubject Comparison and Differences  
of the Semester GPAs and Cumulative GPAs

		Semester prior to the study	Semester of the study	Difference
S1	Semester GPA	2.62	1.69	- .93
	Cumulative GPA	1.69	1.69	0.00
S2	Semester GPA	1.14	3.17	+ 2.03
	Cumulative GPA	1.14	2.42	+ 1.28
S3	Semester GPA	2.00	2.75	+ .75
	Cumulative GPA	1.93	2.13	+ .20
<hr/>				
Median		2.00	2.75	+ .75
		1.69	2.13	+ .44

Table 3

Degrees of Reading Power Under Pretest and Posttest  
Conditions and Their Differences

	Pretest	Posttest	Difference
S1	71/77	76/77	+ 5
S2	75/77	77/77	+ 2
S3	74/77	77/77	+ 3
<hr/>			
Median	74.00	77.00	+ 3



**Figure 1. Group Performance and Individual Performances vs. Kind of Academic Skills. The Horizontal Dotted Line Represents the Median Performance.**

## CHAPTER IV

### DISCUSSION

Contrary to the assumption underlying thousands of hours of remedial activities in universities, teaching academic skills through workshops or through programmed texts did not by themselves cause students to make effective use of those academic skills. And even adding feedback did not sufficiently promote the use of those academic skills. Therefore, the most important outcome of the study was to structure conditions so that students made much more use of the academic skills they had learned.

The feedback and incentives were essential for the maintenance of the use of academic skills, even though the feedback and incentives were too delayed to function as direct-acting behavioral consequences, that is, too delayed to reinforce the use of the academic skills. Perhaps the students stated rules describing indirect-acting contingencies, reinforcement and punishment, and it was those rules that supported the performance of the students, functioning as either discriminative stimuli or motivating conditions (Malott, 1986; Michael, 1986). For example, the students might state rules such as, "If I use the academic skills, I earn my points in self-management." Then, at the time for action, they might restate those rules to themselves and comply with the rules. If they did not comply with the rules, then a mild aversive condition might be generated, containing aversive feelings, self-statements, and

thoughts, such as, "I will not get the points and my grade will be lowered." These aversive motivating conditions could be terminated by complying with the rule. Or the students might present rewarding self-statements, thoughts, or even feelings, when they behaved in accord with the rules (Malott, 1986).

Clearly, the median performance under each condition was higher than the previous one. It might be argued that this improvement was a simple function of maturation and not a result of the experimental manipulations. However, the results were so consistent with behavioral research on performance management (for example, Dillon, Kent, & Malott, 1980) that the increments seem most likely due to the procedures that were implemented and not to the mere passage of time. Moreover, there are few, if any, examples where effortful behavior improves simply as a function of the passage of time following training. Instead, after training there is an initial improvement with gradual deterioration as time passes (K. S. Brethower, 1973). Furthermore, it is almost an everyday finding in behavioral management literature that giving instruction will improve performance slightly, feedback improves performance more, and giving incentives with feedback substantially improves performance (Kent, 1977). Nonetheless, it would be desirable to do a follow-up study where feedback and incentives are removed, to determine if performance is affected. Unfortunately, the findings achieved cannot be compared with other literature because there seems to be no other published research on the maintenance of academic skills (Heiman, 1986). Additional research should also avoid possible difficulties in

differentiating clearly the skills for comprehensive reading and the ones for critical reading; researchers might eliminate critical reading from the skills taught to students to avoid possible sequence effects among two very similar skills. Another future study should focus on the possible functional relationship among the use of academic skills and the students' GPAs. In doing this kind of study a quality control procedure of the skills used should be implemented.

A more subtle line of further study may be a research study designed to impact on the covert problem-solving, asking and answering, analytical approach to reading and studying such as Heiman (1984) recommended. One approach may initially make overt these processes that normally are covert, and differentially reinforce correct instances of the use of these critical skills. It may be that in this way such skills could be shaped, and having been shaped the natural consequences for their use would maintain the covert level. Preliminary work has been done by D. M. Brethower (1970).

## APPENDICES

## Appendix A

### Forms Used by the Study

## STUDENT WORKSHEET FORM. COMPREHENSIVE READING

- I. Textbook..... Chapter.....
- II. General Question.....
- III. Survey to find key words or subtitles of chapter and then turn into questions.

Key WordsQuestions

- |        |        |
|--------|--------|
| 1..... | 1..... |
| 2..... | 2..... |
| 3..... | 3..... |
| 4..... | 4..... |
| 5..... | 5..... |
| 6..... | 6..... |

- IV. Try to answer the questions without reading the chapter.

- |        |
|--------|
| 1..... |
| 2..... |
| 3..... |
| 4..... |
| 5..... |
| 6..... |

- V. Survey each section to check your answers. If they are not correct, write the correct answers.

- |        |
|--------|
| 1..... |
| 2..... |
| 3..... |
| 4..... |
| 5..... |
| 6..... |

## R E C O R D   F O R M   A

## LECTURE NOTE-TAKING

	Weeks													
Skills	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Page number														
Date														
Course name														
General questions about the lecture														
Detailed questions about the lecture														
Answers for each general question														
Answers for each detailed question														
Notes in block forms														
Examples														
Abbreviations														
Observations														

## R E C O R D   F O R M   B

## COMPREHENSIVE READING

	Weeks													
Skills	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Textbook title														
Chapter title														
General questions about the chapter														
Key words or sub-headings														
Questions about the key words/subheads														
Answers for the general questions														
Answers for the key words/subheadings before reading														
Corrections in the answers after reading														
Observations														

## R E C O R D      F O R M      C

## CRITICAL READING

Weeks

## Skills

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Main idea(s)  
in own words

Facts located  
to support  
main idea(s)

Interpretation  
or inferences

## Opinion

## Observations

## Appendix B

### Forms Used in the Center for the Self-Management of Academic Performance

## CENTER FOR THE SELF-MANAGEMENT OF ACADEMIC PERFORMANCE

## STUDENT CONTRACT

Total for Contract \_\_\_\_\_

Student's Name \_\_\_\_\_ Contractor \_\_\_\_\_

Date \_\_\_\_\_

Specify a task for each class in which you are enrolled.

Dept. & #	Task	Proof of Accomplishment	Date	Points

Total for Contract \_\_\_\_\_

Attendance: Yes \_\_\_ No \_\_\_ Pts \_\_\_ Graph: Yes \_\_\_ No \_\_\_ Pts \_\_\_

Flashcards: Yes \_\_\_ No \_\_\_ Pts \_\_\_

Dept & #	Task	Proof of Accomplishment	Date	Points

## CENTER FOR THE SELF-MANAGEMENT OF ACADEMIC PERFORMANCE

## STUDENT CENTER SIGN-OFF FORM

Date \_\_\_\_\_

Student's Name \_\_\_\_\_

Contractor's Name \_\_\_\_\_

Time In: \_\_\_\_\_

Time Out: \_\_\_\_\_

In the space below write the accomplishments you plan to produce in the study center:

Task

Proof of Accomplishment

---



---

(Contractors--circle the appropriate time and task accomplished at the end of the session)

One hourTwo hoursThree hoursOne example for each  
of two flashcardsOne example for each  
of four flashcardsOne example for  
each of six  
flashcards

Or

Or

Or

Quizzed on two  
flashcardsQuizzed on four  
flashcardsQuizzed on six  
flashcards

Pts

Earned \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Bonus

Pts \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Total

Pts \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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