A Treatment Package for Proctor Pre-Quiz Discussion in an Instructor-Paced Introductory Psychology Course

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A TREATMENT PACKAGE FOR PROCTOR PRE-QUIZ DISCUSSION
IN AN INSTRUCTOR-PACED INTRODUCTORY
PSYCHOLOGY COURSE

by

Benjamin Robert Ober

A Thesis
Submitted to the
Faculty of The Graduate College
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Benjamin Robert Ober
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INTRODUCTION

Educators using the Personalized Systems of Instruction (PSI), or modified PSI systems, have stressed the importance of undergraduate students who serve as peer-tutors in the classroom. Keller and Sherman (1974) called these undergraduate proctors "... the real discovery of PSI." Malott and Svinicki (1969) reported that an entire undergraduate curriculum could be supported with tuition alone, and be administered by a staff of student proctors. After initially identifying the proctor as a tutor and a source of personalization in a college course (Keller, 1967, 1968), educators demonstrated that a variety of proctor verbal responses increased student performance and student preference for those settings (Ferster, 1968; Sheppard and MacDermot, 1970; Hursh, Wildgen, Minkin, Sherman and Wolf, 1974). Accordingly, researchers began searching for methods to develop and evaluate proctor behavior in the classroom.

Unfortunately, most training procedures concentrate on developing simple proctor behaviors, and neglect some of the complex behaviors initially identified as important (Miller and Weaver, 1975; Robin and Cook, 1975). Training has largely consisted of the development of proctor administrative behavior and the feedback, prompting, and grading responses centered around the student quizzes. These proctor behaviors usually occurred during the post-quiz period as the proctor and student discussed the student's quiz. During this period extensive answer keys insure correct proctor grading and
explanations of incorrect student responses.

The notion of the proctor as a tutor has given way to the widespread practice of using proctors simply as course monitors and graders who are not a source of critical information (Johnson, 1975; Hess, 1971). Researchers have made little effort to train proctors in ways to help students with the course material before and between quizzes. But there is evidence that simply training proctors to be monitors and quiz graders is not justified; proctors do function in instructional roles, and provide critical information to their students during the pre-quiz period (Ferster, 1968; Sheppard and Mac-Dermot, 1970; Gaynor and Wolking, 1974).

Two methods of proctor selection have been reported in the PSI literature. First, external proctors can be chosen from students who previously took the course; about 80 percent of the PSI courses report using this method (PSI Newsletter, June, 1974). These external proctors receive academic credit for their work, and typically serve for the whole semester. Secondly, Sherman (1971a, 1971b) and Alba and Pennypacker (1972) have described a system with internal proctors who are chosen from students concurrently enrolled in the course. Internal proctors receive course or exam points for their work. These students usually serve as proctors for short time periods on a rotating basis, although some researchers have reported using internal proctors for the duration of the semester (Ensign, 1972; Alba, et. al.)

Some early PSI researchers suggested the characteristic behaviors of proctors in their courses. There was general agreement that
both internal and external proctors prompt student progress throughout the course, developing appropriate student performance on examinations, explain any difficulty that a student may have before and after the student takes a quiz, immediately score quizzes, give feedback to students about their performance in the course, and point out any material not mastered (Born, Gedhill and Davis, 1972; Keller, 1967, 1968). Keller had the foresight to identify "...almost unavoidable tutoring" that proctors provide.

Unfortunately, the subsequent research indicated that some of these proctor behaviors did not consistently increase student performance. Although the research with pre-quiz proctor-student discussion showed beneficial results, the work with proctor behaviors occurring after the quiz has shown less promise.

Farmer, Lacter, Blaustein and Cole (1972) reported an experiment on the effect of proctor interactions on student performance. Students who took various numbers of quizzes with external proctors progressed through the course faster, and scored higher on the final exam, than students with no proctoring interactions. This study demonstrated that the presence of a proctor was somehow beneficial, but the experimenters did not identify the specific proctor behaviors responsible for the effects.

In a related study, Johnson and Sulzer-Azaroff (1975) found that students who were not exposed to proctors needed to remediate more quizzes than students who took quizzes with proctors. As in the Farmer et. al. (1972) experiment, this second study also failed to specifically identify the proctor behaviors controlling student
performance.

Each of these studies compared student performance with proctors against student performance without proctors. In all of the proctoring situations, students took the quiz in the presence of a proctor who graded the quiz and gave immediate feedback for correct written and/or vocal student responses during grading. Students in the no-proctoring conditions typically received their graded quiz at the end of the session with no interaction with the proctor grader. The only consistent benefit of proctoring was that students had to retake fewer quizzes when quizzes were proctored.

A recent experiment by Hursh et al. (1974) identifies post-quiz proctor behaviors as the probable cause of these results. In this research, the experimenters report a procedure where two groups of students were exposed to periods of proctor discussion during quiz grading. The post-quiz proctor discussion consisted of proctor prompts, explanations, and "leading questions" until the students corrected their incorrect quiz responses during grading. If it became obvious that the student could not answer the question, the proctor moved on to the next incorrect quiz answer. If the student could give a correct answer during the discussion, the proctor gave him credit for it. Students in the no-discussion condition simply received the graded quiz with the incorrect answers indicated, and did not have the opportunity to discuss these answers with the proctor. Hursh et al. found that the initial written quiz performance dropped when students could discuss their incorrect answers with proctors and gain lost points. Like proctored students in the
Farmer et al. or the Johnson and Sulzer-Azaroff studies, students in the post-quiz discussion took significantly fewer retakes than students without proctor discussion. And not surprisingly, all students preferred this proctor discussion condition when given the choice at the end of the experiment.

The results of the study by Hursh et al. may explain the reduced student retesting reported by Farmer et al. and Johnson and Sulzer-Azaroff. The reduction probably occurred because the proctoring conditions allowed opportunities for quiz regrading not present for the no-proctoring students.

Although these post-quiz proctor behaviors may have explained decreased retesting, Farmer et al. also report favorable effects on the final exam performance of proctored students. This finding was supported by Calhoun (1973), who found that proctored students scored higher than students with no proctoring on the final exam and a three month follow-up retention test. But neither researcher identified the proctor behaviors responsible for that increase. It may be that the pre or post-quiz discussions with proctors somehow provided additional information or practice which subsequently helped students on the exam.

Several investigators have reported on the importance of proctor pre-quiz oral interviews and discussion with students: Ferster (1968) reported favorable results when using a proctor oral interview technique. In this study, internal proctors conducted several interviews with students over material to be covered on an upcoming quiz. Interviews lasted about ten minutes, during which the proctor
prompted and praised correct student responses, and also corrected and explained incorrect student responses.

Sheppard and MacDermot (1970) reported that students said they found the oral interview technique effective in aiding mastery of course materials, helpful in generating good study habits, effective in providing increased interactions, and helpful in generating active involvement in the course. Both experiments only compared interviewed student performance with that of students in more traditional course settings. The experimenters did not identify any effects of pre-quiz interviews independently of other aspects of the procedure such as self-pacing or frequent quizzes.

Gaynor and Wolking (1974) used more equivalent conditions to compare the effects of proctor interviews on student performance under two proctoring systems. An interview group, proctored by internal proctors, used a variant of Ferster's technique where interviews preceded quizzes. A no-interview group was proctored by external proctors and followed the same general course procedure as the interview group except no pre-quiz interviews occurred. The results indicate that the interview group scored significantly higher on first-attempt unit quizzes and four review quizzes. Rather than point out any differences due to the internal and external proctors, the experimenters equated the groups, and concluded that the interview proctoring behavior was responsible for the increased student performance. These studies of pre-quiz proctor behavior show the importance of this discussion for the performance and preference of students exposed to such interviews.
Miller and Weaver (1975) provided perhaps the first identification and specification of a procedure to develop desirable proctor behaviors. The authors initially identified the basic tasks of proctors as: 1) monitoring the course progress of their students; 2) assisting the students with questions they have over the course material through explanations and prompting correct responding; and 3) scheduling reinforcing consequences following correct student responses.

Miller and Weaver developed a training package for these three proctoring behaviors. First, preparation behaviors were defined as greeting the student by name, reviewing the students' folders to see how they were progressing in the course, and asking the students if there were any questions over the lesson material. Secondly, prompt behaviors included asking the students to attempt to answer their own questions, asking the students to provide a definition of terms in an answer, and asking the students to provide an explanation in terms of the definitions used in an answer. Finally, praise behavior consisted of the proctor providing social reinforcement for student progress, for both prompted and unprompted correct responses, and for demonstrating mastery over a unit.

Training occurred in special classroom simulation sessions, where proctors engaged in scripted role-playing with a trainer who acted the part of the student. In addition, proctor trainees took short quizzes over instructional materials relating to the three proctoring behaviors. Miller and Weaver found significant increases in the three proctoring behaviors as measured in subsequent novel
role-playing sessions and actual classroom sessions.

But Miller and Weaver did not isolate the effects of their package on the proctor behavior before the quizzes from the effects on post-quiz responding. Data on proctor prompting and praise behaviors were collected both before and after quizzing occurred. It is possible that the package differentially increased only those proctor behaviors emitted during the post-quiz discussion, or vice-versa. Based on the results of Hursh et al., much of the proctor responding may have taken place after the quiz. The results do not validate the package's effectiveness on the specific development of either pre or post-quiz praises or prompts.

In a similar experiment, Robin and Cook (1975) report on a training package for nine proctoring behaviors. The behaviors were greeting the student, giving clear feedback, giving evaluative comments, telling the students to proceed, listening without interruption, giving a pass-fail statement, making a closing comment, asking for a non-quiz related course question, and administrative behavior. The package consisted of role-playing sessions, instructor-proctor discussion, and feedback on actual classroom proctoring. The experimenters introduced this training to six external proctors using a multiple baseline design across subjects.

The training package produced consistent increases across subjects for five proctoring behaviors. The package increased greeting behavior, clear feedback, evaluative comments, administrative behavior, and clear pass-fail statements. The training package failed to produce consistent effects on closing comment behavior and asking for
non-quiz related course questions. The two remaining behaviors, listening without interruption and telling students to proceed, occurred at near perfect levels from the onset of the experiment.

Both training packages neglected a pre-quiz proctor behavior that Miller and Weaver initially identified as crucial: Proctors were not trained to give correct explanations to help students who had questions over the course matter before the quiz. Explanations might consist of the definitions, directions, descriptions, and examples emitted by the proctor to help students make a correct response. Instead, proctors in these studies were trained only to prompt for these responses from the students. The training failed to prepare proctors for a pre-quiz interview situation in which they could give correct explanations when students could not answer, or when students asked a question. And like the subjects reported in Miller and Weaver's research, proctors in Robin and Cook's study were not specifically trained to explain subject matter to students during the pre-quiz period.

Another problem with these studies was that the experimenters never fully examined the specific occasions, or opportunities, for the different pre-quiz proctor responses. It is possible that the reported increase in proctor responding represents prompts or praises emitted at inappropriate times. For example, proctors may have praised a student after an incorrect response, or prompted a student to give a definition of a reinforcer when a definition of shaping was called for. But these problems probably did not occur during quiz grading; proctors in the study had answer keys and could
reliably judge the correctness of student responses to specific quiz questions.

It is difficult to define opportunities for different proctor prompts, praises, and explanations during this pre-quiz period. The proctor must emit these responses when a student's vocal response is related to the subject matter taught in the course. Praise is appropriate when a student response matches, or approximates, the correct answer defined by the subject matter. Prompts should occur when the student is having a problem giving a fully correct response. Proctor prompts are appropriate if they help the student give the correct response through defining or explaining subject matter relevant to the correct response. Proctor explanations should be forthcoming when a student cannot answer, or if the student asks for an explanation. In most cases a thorough knowledge of the subject matter is essential if a proctor is to properly behave with respect to these novel correct or incorrect student responses during the pre-quiz interview.

Educators using proctors have acknowledged the fact that proctors need to know the subject matter in the course extremely well. The most common procedure is to select proctors who performed best as students (Semb, 1975). Born and Zlutnick (1972) even suggest that the proctor be required to pass quizzes over each unit of material if they had not done so in the previous semester. In most courses, brief material review quizzes occur on a once a week basis (Johnson, 1975). The present study represents an integration of proctor training and material review procedures to insure the effectiveness and
appropriateness of proctor responding in the pre-quiz period.

In the present study the treatment package provided several concurrent procedures designed to prepare proctors for pre-quiz discussion over the course material with their students.

This study represents a combination of the training techniques developed by Miller and Weaver (1975) with those of Robin and Cook (1975). Like Miller and Weaver's research, the present proctor treatment package included instructional materials with required quizzes related to the proctor behaviors of interest. In addition, the package included scripted material to simulate the student responses of concern to the proctors. The treatment package in this study also used feedback on actual classroom proctoring and the instructor-proctor discussion procedure described by Robin and Cook.

Although several investigations reported positive effects of pre-quiz proctor responses on student performance, training packages for proctor behaviors have neglected this aspect of proctoring. Instead, the packages have largely developed post-quiz proctor behaviors which do not prepare the proctors for the novel student questions in the pre-quiz discussion period (Miller and Weaver, 1975; Robin and Cook, 1975). Both studies also failed to report a procedure for developing proctor explanations during this period.

The present research addresses these issues by examining the effects of a proctor treatment package on proctor praises, prompts, and explanations, prior to quizzing.
METHOD

Subjects

Eight undergraduate proctors were randomly selected from a group of 15 proctors who volunteered to participate in the study. The proctors enrolled for three credit hours of teaching apprentice credit and proctored in an introductory psychology course at Western Michigan University. Proctors completed the course within the previous year with a final grade of "A". Each proctor worked with one section of 24 students. From these eight proctors, four were randomly selected to serve as experimental subjects for a proctor treatment package.

Setting

The course procedures closely resembled those in many PSI courses; students took frequent quizzes over small units of material, objectives outlined important areas to study, point systems supported and maintained student performance throughout the semester, students received immediate feedback on performance and always knew their course standing, and finally, proctors administered the course on a daily basis.

The course did differ from standard PSI in three important ways. First, students in the course progressed at a predetermined rate; no self pacing was in effect. Second, students were not required to
master each unit before going on to the next, but they had to have 90 percent of the overall course points to receive a "B", 80 percent for a "C", and so on. Third, students took midterm and final exams which allowed them to increase their course grade by one level. For example, students who earned 90 percent of the course points (receiving a "B") could earn an "A" by also scoring at least 90 percent on the combined midterm and final, or on the final alone.

Proctor duties occurred in a two hour block, five days per week. Each day, proctors cared for experimental animals and spent the remainder of the first hour updating and recording student data. During the first four days of the week the second hour duties consisted of in-class proctoring activities. Proctors conducted a ten-minute, pre-quiz discussion, administered a short reading quiz, and supervised a lab period.

Proctors in this setting did not grade the student's quizzes. All quizzes were graded by a machine which automatically scored and marked the tests. But proctors provided immediate quiz feedback by reading the correct answers to the class after collecting the answer sheets. The only other proctor task concerning the quiz was to correctly record the machine graded score in a student record book. On Thursdays proctors and students watched a video presentation, after which proctors conducted a brief discussion and administered a quiz over both the video presentation and the readings. No lab period followed the Thursday quiz. On Friday, proctors supervised optional lectures and a make-up lab for the students.

Proctor grades were determined by daily performance points and
points earned by attending a weekly meeting. Daily performance points were earned if the proctor satisfactorily completed specific tasks each day. These tasks primarily involved the administrative behaviors of the proctors needed to insure the smooth running of the course. Typical tasks were: arrive on time, accurately record student data, feed experimental animals, record lecture attendance, hand out quiz at ten minutes past the hour, and leave the classroom clean. Advanced course apprentices monitored these daily tasks and recorded earned points for each proctor. The weekly meeting consisted of a standard 20 point quiz over the subject matter designed to help proctors review the course material. Daily and weekly points were combined. Proctors received an "A" for 90 percent of the points, a "B" for 80 percent, and so on.

Experimental design

The experimenter randomly selected three of the experimental proctors to participate in a proctor treatment package. These three proctors were exposed to the treatment package in a multiple baseline design across subjects to assess the effectiveness of the package. In addition, all subjects took a pre-test consisting of a novel version of the course exam. Proctors took the pre-test at the beginning of the experiment, and took a different form of the same test at the end of the semester as a post-test. Pre and post-tests counted as 20 points toward each proctor's final point totals for the course.
Treatment sessions

Experimental sessions occurred daily, Monday through Wednesday of each week. The three treatment proctors self recorded their own verbalizations in the classroom with portable cassette recorders. The proctors recorded the ten-minute pre-quiz discussion, starting when they went into class and ending when they handed the quiz out to the students. After collecting the quizzes and reading the correct answers, proctors recorded any additional discussion as they briefly talked with students while the class prepared for lab. The proctors stopped recording when rat lab started. The duration of these post-quiz recordings was approximately one minute.

An observer listened to the tapes and recorded the daily frequencies of three proctoring behaviors for each subject. The behaviors of interest were: "Prompting behavior", "Praise behavior", and "Explanation behavior."

Prompts consisted of the proctor verbally asking: a) the student(s) to answer a question, or b) the student(s) to ask a question. The observer only counted prompting behavior when the proctor's prompts were specific to course subject matter or course procedures. Appendix A lists some instances of prompting behavior.

Praises consisted of the proctor verbally emitting a praise response: some indication of a correct, or partially correct, student response. The observer only counted those proctor praise responses directed at student responses concerning subject matter or course procedures. Appendix A lists some instances of praise behavior.
Explanations consisted of the proctor verbally giving a definition, direction, description, or example pertaining to the subject matter or course procedures. Appendix A lists some instances of explanation behavior.

Treatment package

Each treatment subject encountered the package at a different point in the experiment. Once a subject started the treatment package they remained in the package conditions for the duration of the experiment. The treatment package consisted of two components designed to develop and support the three proctoring behaviors.

The weekly component

When the package started, the proctor stopped attending the standard weekly staff meeting. Instead, each proctor was required to attend training sessions during this meeting time. The sessions consisted of discussion and quizzing over instructional materials pertaining to the three proctoring behaviors. Proctors had to master these materials with 90 percent accuracy before beginning the next section. Each of the three quizzes in the instructional materials counted the same as the standard 20 point regular staff quiz. After the initial weekly session the experimenter provided the treatment proctor with feedback over actual classroom proctoring behaviors. During feedback sessions, the experimenter and proctor discussed the data recorded the week previous to the training session. Both the instructional materials and the feedback sessions gave social
reinforcement for frequent use of the three proctoring behaviors.

Weekly proctor training with the instructional materials lasted for the first three weeks of treatment. The remaining weekly sessions solely consisted of the experimenter-proctor feedback procedure. Treatment proctors automatically received the full 20 standard meeting points for attending the remaining feedback-only sessions.

The daily component

In addition to the weekly sessions, the treatment package included an intensified review of the course subject matter. Treatment proctors completed daily worksheets and quizzes. In this way, proctors covered the same material as their students each day. The worksheets consisted of about ten questions over important concepts in this material that the proctor's students would cover that day. The proctor turned a completed worksheet in to an on-duty staff member who scored the worksheet and returned it to the proctor during the hour before the proctor's class met. In order to receive full points, the proctors corrected any errors in their worksheet before taking the quiz. The quiz usually consisted of two short questions over the daily material. Treatment proctors turned in corrected worksheets and took quizzes before going into class each day. The worksheet and quiz questions were designed to evoke written proctor responses which closely resembled the vocal responses the proctor might emit in the classroom discussion. The questions frequently were scripted student responses which served as prompts for the proctor to recognize correct student responses, to correct incorrect student
responses, or simply explain a correct response. In all cases, correct answers were defined by the subject matter covered that day. Worksheet and quiz points counted toward the proctor's final course grade. Treatment proctors received four daily points for this material review. Each proctor's material review points added to their regular cumulative point total.

Reliability

The observer and a reliability observer made independent observations of the three proctoring behaviors for each subject. The reliability observer generally observed one session for each subject each week. A measure of reliability was obtained by comparing these reliability observations with the observer's data on the occurrence of the three proctoring behaviors for each session. This measure was computed by dividing the number of agreements for each proctoring response by the number of agreements plus disagreements.
RESULTS

The results indicate that the treatment package was effective in increasing the frequencies of the three proctoring behaviors for each subject. In addition, the treatment group scored significantly higher than no-treatment proctors on a post-test over the course textbook.

The multiple baseline data were derived from tape recordings of two segments of actual in-class proctor discussion periods. First, proctors recorded pre-quiz discussion which lasted about ten minutes, and ended when the proctor handed out the quiz. Second, the proctors recorded the brief discussion after they read the quiz answers. These discussions were one minute long, lasting only until the lab started. So these post-quiz proctor responses only accounted for about nine percent of the in-class data collected in this experiment.

Reliability for observing the three behaviors averaged 94 percent, and ranged from 78-100 percent. Individual reliability for prompts, praises and explanations were 93, 95, and 93.5 percent, respectively.

Figures 1, 2 and 3 show the session by session frequencies of prompts, praises, and explanations for each subject. The multiple baseline design produced differing durations of treatment for the three subjects. Some sessions were lost for each subject, either because of proctor absences or failure of the recording equipment.
Figure 1. Session by session frequency of prompts, for each subject.
Figure 2. Session by session frequency of praises, for each subject.
Figure 3. Session by session frequency of explanations, for each subject.
Pre-quiz proctor behavior increased when each proctor started treatment. In general, each subject's responding increased continually while they were in the treatment package conditions. The median daily rate increased from baseline rates during the treatment phase for all three subjects and all three behaviors. The greatest increase for all three behaviors was shown by the first proctor, the subject with the longest duration of sessions in treatment.

Explanations were the least frequent of the three behaviors examined. Although they occurred least often, explanation behaviors showed proportionally similar increases in the treatment condition for each subject.

Figure 4 shows both group median and individual percent correct responding on pre and post-quizzes for treatment and no-treatment subjects. The individual data show that only three of the no-treatment proctors demonstrated increased mastery of the subject matter on the post-test. The remaining two proctors in this group did poorer on the post-test. All of the treatment subjects, however, showed increased mastery on the post-test. Increases were significantly greater for treatment subjects (ANOVA .05). Treatment proctors increased by 17, 19, and 10 percent, respectively. The three no-treatment proctors who did score higher only increased by 13, 8, and 7 percent.

Group medians also showed this positive effect of treatment. The no-treatment group showed an overall increase of only three percent while the treatment group showed a 10 percent increase.
Figure 4. Group median and individual percent correct responding on pre and post-tests for treatment and no-treatment subjects.
DISCUSSION

The results of this experiment clearly indicate that the treatment package, as a whole, was an effective means of increasing the desired pre-quiz proctor behaviors. However, the treatment-package approach confounded an analysis of the specific effects of the different components of the package. Although both weekly and daily components began simultaneously, different segments of the weekly component were implemented throughout the experiment. This allows for some tentative analyses about the relationships between the different component conditions and the ways in which proctor behaviors increased.

The weekly component

The weekly component consisted of instructional materials for the three proctoring behaviors and weekly feedback for actual classroom proctoring. The first session occurred in the evening, after the first day of treatment. During this session proctors were given instructional materials and instructed to read them and be ready for a quiz during the next weekly session. Proctors completed the materials in three weekly sessions. After the first week, proctors also began receiving feedback during these sessions; after the instructional materials were completed, proctors received feedback only during the remaining weekly sessions.
The results suggest a positive relationship between the length of time a subject spent in treatment and the amount of subsequent increase in proctor responding; subjects exposed to longer periods of treatment had the greatest increase in responding. The responding of the first proctor showed a continuous increase during the classroom sessions following the third weekly session. The experiment, and the semester, ended shortly after the second and third proctors finished the instructional materials and started the feedback-only meetings. The behavior of the second and third proctors might have shown greater in-class behavioral increases if the post-materials classroom sessions and weekly feedback were as extensive as those for the first proctor. These results indicate that early completion of the instructional materials and extended weekly feedback provided the most beneficial effect on pre-quiz proctor responding.

The features of the weekly component of treatment have been effectively used and reported in the previous proctor training research. Both Miller and Weaver and Robin and Cook included written instructional materials pertaining to the proctor behaviors of interest. And Robin and Cook also report on the effective use of feedback for actual in-class proctoring. The results suggested that these components were similarly successful in the present treatment package.

The daily component

The daily component consisted of scripted text-review exercises
that began the first day of treatment and continued for the duration of the experiment. The text-review procedure provided a daily four point contingency requiring that proctors restudy the text matter currently being covered by their students.

Each proctor's in-class responding showed an immediate increase following the start of the daily text-review component. The weekly component was probably not the cause of this immediate change in proctor responding. Although proctors received the written instructional materials after their first day of treatment, they were not responsible for reading them until the next weekly session. Furthermore, these materials consisted of a short introduction to the weekly component and the section on the importance of prompting. It is unlikely that these materials provided any consistent effect on all three proctor behaviors this early in treatment. Since proctors were not required to study the materials until the next weekly session, it was not even clear that they read these materials during the first week.

However, all three proctoring behaviors did show a consistent increase during this first week, across subjects. The increase was even observed on the first day of treatment, before the weekly materials were handed out. The daily text-review procedure most likely accounts for this immediate effect. Reports from the subjects also supported this hypothesis. Each proctor verbally reported that the daily text-review helped increase their "confidence" and "preparedness" to praise, prompt for, or explain correct responses when discussing the material with their students. Each proctor typically
made these comments in the experimenter's presence in the weekly session following the first week of their exposure to the text-review procedures.

Although the proctors were selected for knowledge of the subject matter, and given a standard weekly text-review quiz, actual in-class responses during baseline were relatively infrequent for each proctor. Even with the standard quiz, proctors reported feeling unprepared for in-class discussions with their students. Proctors may have been reluctant to prompt, praise, or explain correct responses because the selection factors and weekly quiz did not insure a thorough review and preparation for proctor discussion over the subject matter.

Selection shortcomings

In this study, students were required to pass the course with an "A" before becoming proctors. This fact, however, did not guarantee high levels of subject matter knowledge when they subsequently proctored the course. At the beginning of the study, the experimenter administered a pre-test consisting of a novel version of the course final exam. Although these proctors were required to pass a similar exam with 90 percent correct as students in the course, pre-test results indicated an overall group mean of 79 percent correct for the eight proctors, with no scores in the 90 percent mastery range.

These findings indicate that simply passing the course with an "A" did not insure mastery of the subject matter when the student later became a proctor. This problem probably had two causes.
First, the deficit may have been caused by the elapsed time between taking the course as a student and later proctoring. In some cases, up to a year passed before a student proctored. This varying amount of time in other settings probably accounted for the fact that proctors scored below 90 percent on the pre-test.

Secondly, less than perfect course procedures may have contributed to the low pre-test scores. The 90 percent course requirement did allow a ten percent student error rate. Potential proctors for this research could have failed several units and still received an "A" in the course. Both the initial lack of complete mastery, and elapsed time, may have contributed to low pre-test scores. Perhaps if we wanted a 90 percent proctor entry performance on the pre-test, we should have required 100 percent mastery for initial proctor coursework.

**Standard review quiz shortcomings**

Although proctors initially mastered the subject matter at 90 percent, entered proctoring with 79 percent, and took the standard weekly text-review quizzes, baseline rates of proctor discussion dealing with this course matter were low. Even with these prerequisites, the proctors were not prepared to praise, prompt for, or explain correct responses in discussions with their students.

For all proctors, these behaviors did increase when treatment started, and they were required to restudy each unit on a daily basis. The scripted worksheets and quizzes required that proctors be prepared to prompt, praise, or explain correct student responses
for each unit of the text. The daily text-review component helped
proctors review and prepare for in-class discussion by requiring
frequent practice over these target behaviors with respect to the
actual subject matter to be discussed. In each case, in-class res-
ponding of the proctors immediately increased following the first
day of the text-review procedures.

Post-test results also suggest this positive effect of treat-
ment. Of the five proctors exposed to the standard weekly review
quiz, only three showed an increase over their pre-test score on
the post-test at the end of the study. The performance of the re-
main ing two subjects actually decreased after a semester of weekly
quizzes and proctoring. Subjects exposed to the daily text-review
in treatment showed substantial increases in post-quiz scores com-
pared to no-treatment proctors.

These results more than support the recommendations of Born and
Zlutnick (1972), who suggested that the proctor be required to pass
quizzes over each unit if they had not done so in a previous semes-
ter. The present study indicates that an even more intensive re-
view may be in order; proctors should be required to master all
course subject matter again.

These findings may be related to earlier research with internal
proctors. As previously stated, Gaynor and Wolking (1974) found
that students with internal proctors, who interviewed the student
before quizzing, scored higher than students exposed to external
proctoring. Other experimenters reported the beneficial effects of
these pre-quiz interviews in which proctors and student discussed

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material covered on an upcoming quiz (Sheppard and MacDermott, 1970; Perster, 1968). In each case, internal proctors were freshly acquainted with the course material, and had recently passed quizzes over the units proctored. Like proctors in the present study, these internal proctors may have been more adequately prepared to discuss the material with students because of frequent, recent exposure to this subject matter. The resultant high levels of proctor responding may have caused the reported increase in student performance and student preference in those settings.

Students exposed to internal proctors who interview may benefit from, and prefer, the intensified proctoring from these well informed students who concurrently study the material as they proctor. Indeed, almost all reported interview procedures have occurred in internal proctor settings. There have been no successful attempts to develop this behavior when using external proctors until now.

**Praises, prompts, and explanations**

In observing pre-quiz proctor responding, the three behaviors often covaried in the classroom sessions. These behaviors occurred in the same relative frequencies, despite inter-session changes in total response frequency. The most frequent proctor responses were praise behaviors. The frequency of prompts usually closely followed praise responses, and explanation behaviors were least frequent. These findings indicate that proctor praises, prompts, and explanations are interrelated in the pre-quiz discussion. This interrelationship may be better understood by examining the three common
sequences of proctor-student interaction during the discussions.

All three sequences included at least two of the proctor behaviors. In the first sequence, proctors prompted for a specific answer to a question. If the student's answer was correct the proctor gave feedback in the form of praise. If the student was partially correct, or incorrect, the proctor praised the attempt but prompted a more complete answer or explained the correct answer. In the second sequence the students asked proctors questions. In this situation proctors encouraged the student to attempt an answer to his question through prompting. If this failed, proctors explained the correct answer.

A less frequent third sequence was observed when students spontaneously responded and asked the proctor for evaluative feedback on their answer. If correct, proctors delivered praise. If the student's response was incorrect the proctor praised and either prompted for additional student responding, or explained the subject matter in question.

The fact that praise behavior occurred most frequently indicates that proctors were primarily reinforcing correct student responding in the discussion period. This student responding was encouraged whenever possible by proctor prompts designed to evoke the correct student responses. In the occasional instances when students were unable to respond correctly, proctors explained the correct response. This distribution of pre-quiz comments is in agreement with the initial work of Perster and Sheppard and MacDermott in the oral interview method. Both researchers reported that the primary purpose of
the interview proctor was to encourage active student responding in the interview period. In these studies, interviewing proctors explained the correct answer when students could not, or if the student asked a question. Miller and Weaver also identified praises, prompts, and explanations as important proctor behaviors.

Unfortunately, the training packages reported by Miller and Weaver and Robin and Cook both failed to specifically develop these behaviors in the pre-quiz discussions. In addition, neither package successfully report a procedure for producing explanation behaviors. The present research addressed both issues by examining the effects of a treatment package on proctor comments prior to quizzing. The package was effective in increasing praises, prompting, and explanations during this period.

The author's experience with the development of proctor explanations may clarify some of the possible student benefits of these proctor behaviors. Explanations were defined as proctor definitions, descriptions, directions, or examples which were emitted to help the student make a correct response. Any of these proctor responses could serve as a formal prompt if the student had to specifically give that response (Skinner, 1957). For example, if a student could not emit a definition of a reinforcer, a correct proctor definition of a reinforcer was a formal prompt for the student's response. Although any subsequent student response could be echoic in nature, this procedure helped students make correct responses and may have helped them make the response in later novel situations. Correct proctor definitions, descriptions, directions, and examples could all

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serve in this formal function if they directly provided the student with a useful answer.

These explanation behaviors were also helpful if they indirectly helped students emit the correct response. Definitions usually provided information about the response and the controlling stimuli for that response. If the proctor said, "A reinforcer is a stimulus or event, immediately following a response, which subsequently increases the rate of that response," the student received two valuable pieces of information. First, the definition described the verbal response "reinforcer." Second, the definition provided a description of stimuli controlling the correct usage of this term. Students would correctly use "reinforcer" in the presence of stimuli or events which increased the rates of the behavior they closely followed. Descriptions also served this useful function of providing information to the student about the response or the controlling stimuli for that response. Both definitions and descriptions might help students by helping them make subsequent correct responses in the presence of the appropriate stimuli.

Directions typically consisted of those occasions when the proctor combined descriptions about the responses, the controlling stimuli, and the rewards to help the student achieve that reward. If students wanted to get something, then the proctor's descriptions of how to get it served as directions for the students' acquisition of that reward. Examples were given by the proctor when students failed to respond in a novel situation. The proctor usually gave examples of other novel instances in an attempt to provide the student
with experience to make correct generalizations in the future. In all cases, proctor explanations were given to help students subsequently make correct responses.

Applications for student-paced courses

Because the present experiment occurred in an instructor-paced setting, special consideration must be given when generalizing the results and procedures to the many self-paced PSI courses. In the present setting, all students took a quiz over a specific unit each day. This allowed a unique opportunity to observe pre-quiz discussion because students invariably asked many questions, and made many responses relative to the daily course unit. This daily quiz was also convenient for training since the proctor material review simultaneously dealt with the subject matter covered by the students each day. Many PSI courses lack this concurrent quiz option because of self-pacing. In those settings a proctor's students may be at differing units in the course and a wider variety of subject matter may come into play.

This problem can be solved in a number of ways. The author has had experience with a successful proctor materials review procedure in a self-paced PSI setting at Western Michigan University recently. Proctors in the Student Centered Education Project (Malott and Hartlep, 197) reviewed the course material using two methods. Proctors in the introductory courses took two essay quizzes each week which covered the subject matter. Meetings accompanying these quizzes provided opportunities for proctors to discuss the material, and
possible student misunderstanding, with advanced introductory course proctors. Proctors for the advanced courses reviewed the material in daily consistency meetings, and participated in quiz and answer key composition over the course materials. In both cases the material covered in the proctor review was for quizzes targeted for student completion within two course days. Since student rate through both courses was largely governed by target dates, this procedure insured that proctors reviewed the subject matter before the students encountered it.

Any effort at integrating proctor review sessions with a PSI course must be made with respect to the usual student rate of progress through the course. The most effective procedure would provide for an intense proctor review of subject matter before proctoring students over those units. If a course provides multi-semester options some students may be finishing the course while others are just beginning. In extreme cases like this the units might be subdivided into sections with proctors specialized in those certain subject matter areas. In this way students would be assured of interacting with a proctor well versed in the unit, regardless of the student's degree of progress through the course. Although this latter method might deprive proctors from a well rounded course review, their specialization would insure adequate coverage of student needs in self-paced courses.

The material review procedure might also function to increase proctor grading accuracy and consistency in a PSI course. Proctors in the advanced S.C.E.P. courses reported that the daily materials
review meetings helped them more accurately evaluate written student answers on quizzes. Although most PSI settings provide answer keys, additional materials review may help proctors discriminate correct, or partially correct answers not included on the answer key.

The instructor-pacing also minimized the effect of many of the familiar PSI post-quiz proctor behaviors. Quizzes in this setting were computer graded. Proctors simply read the correct answers after all students finished the quiz. Additional proctor-student interchanges about the quiz, or other course matters, continued during the minutes before rat lab began. In no instance could a proctor re-grade any quiz items, even if a student gave a correct answer during this short period. This present setting did not resemble those reported by Miller and Weaver and Robin and Cook in which high levels of proctoring behavior occurred when proctors could award regrade points during quiz grading.

Applications to instructor-paced settings

The findings of this study indicated that the most successful treatment package was the one that started earliest in the semester. Early completion of the instructional materials and extended weekly feedback had a cumulative effect in increasing pre-quiz proctor comments. For this reason the introductory psychology course reported in this experiment subsequently required that all potential proctors complete these materials prior to any actual proctoring. Students wishing to proctor the next semester completed the instructional materials on proctoring as part of their initial course
requirement. Advanced course assistants provided weekly feedback on actual in-class behaviors when these students proctored the following semester. In this way, proctors received an early introduction to the instructional materials and almost continuous weekly feedback when proctoring.

Three aspects of the results suggested a change in the course procedures which would require that all proctors restudy the text material on a daily basis. First, the frequent scripted text-reviews helped to increase desirable in-class proctoring behaviors. Secondly, the evidence indicated that treatment increased proctor performance on a subject matter exam at the end of the study. Finally, proctors exposed to the text-review procedures overwhelmingly supported its effectiveness in preparing them for pre-quiz discussions with students. For these reasons, the standard weekly review quizzes in the setting were replaced with a daily text-review procedure.

Conclusions

This study did not investigate the effects of increased pre-quiz proctor responding on student performance, nor did it assess these effects on student preference for trained proctors. The goal of this research was to simply produce increases in this behavior, a logical prerequisite for analysis of this variable. First, we needed to determine if these behaviors could be developed and measured.

The results indicated that the treatment package was effective in generating and measuring pre-quiz proctor discussion. The treatment package may help further research by providing procedures to
develop and measure levels of pre-quiz discussion as a useful independent variable affecting student performance. Based on the findings of Ferster (1968), Sheppard and MacDermott (1970), and Gaynor and Wolking (1975), it can be expected that these proctor behaviors strongly contribute to good student performance in PSI courses.

The treatment package component effects were not isolated in the research. Although each component seemed to have beneficial effects, it may be that deletion of feedback, instructional materials or the text-review has no effect on the proctor behavior increases. An analysis of the independent component effects might clarify these relationships and suggest even more effective procedures for developing pre-quiz proctor behaviors.

The results did indicate that proctor knowledge of the subject matter was an important factor in pre-quiz responding. Educators using external proctors may especially need to consider more intense proctor review procedures to facilitate proctor discussion.

The primary importance of this treatment package is in the development of proctor interactions with students before a quiz. Especially important was the inclusion of proctor explanation as a target behavior for the treatment package. Explanation behaviors have been identified as crucial to proctor performance; yet this is the first research that suggests effective means of obtaining this important proctor behavior.

Hopefully, the analysis and techniques described in this research will help other educators train their proctors to be the "tutors" initially envisioned by Fred Keller.
REFERENCES


PSI Newsletter. Published by the Center for Personalized Instruction, Georgetown University, Washington, D.C., 1971.


APPENDIX A

Examples of the Three Proctoring Behaviors
PROMPTING BEHAVIOR

1. Asking the student to answer a question
   a. "Can anyone give an example of a punisher?"
   b. "Jack, can you give me a definition of a conditioned reinforcer?"

2. Asking the students to answer a question
   a. "Does anyone have any questions over unit #12?"
   b. "Do you understand the example in the book, Rich?"
   c. "Is everyone familiar with the second lab experiment?"

PRAISE BEHAVIOR

1. Indications of correct responses
   a. "That's right, Sue, reinforcers occur after the response."
   b. "Good point, Bob; we are affected by the laws of behavior."
   c. "Right!"
   d. "Nice work on your lab report and experiment, Mary."

2. Indications of partially correct responses
   a. "That's almost right, Jack."
   b. "Nice try."
   c. "You're partially correct, Alex."

EXPLANATION BEHAVIOR

1. Definitions
   a. "A definition of a reinforcer is a stimulus or event, occurring after a response, which increases the rate of that response."
2. Directions
   a. "To operate the water dipper, fill the tray with water and press the brass lever."
   b. "If you want to develop a conditioned reinforcer, pair it frequently with primary rewards and it will become effective."

3. Descriptions
   a. "When you see a decrease in the response rate."
   b. "In that case it would be a punisher."

4. Examples
   a. "When you go when a traffic light turns green you are under control of that stimulus."
   b. "For instance, many schoolchildren misbehave because of inappropriate teacher attention."