Discussion Procedures in College Teaching

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DISCUSSION PROCEDURES IN COLLEGE TEACHING

by

Victor A. Arredondo

A Thesis
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of the
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Victor A. Arredondo
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Following Keller's suggestions (1966; 1969) for implementing contingency management in college instruction, considerable work has been reported (Corey and McMichael, 1970; Ferster, 1968; Malett and Svinicki, 1968; Sheppard and MacDermot, 1970).

Among the more important steps in such an approach are the following: a clear specification of the responses to be learned; frequent short reading assignments and quizzes; immediate feedback from students' performances; a reduction of the student faculty ratio by using advanced students (proctors); and the programming of all the students' and proctors' activities in such a way that their performance is specified, observed and consequated. This also provides an ideal setting for an empirical analysis of the effectiveness of certain components of the program or of new procedures.

Student-led discussion-group procedures have been recently considered as an effective educational aid in college instruction. The positive consequences of such procedures have been reported to be: "an increase in the facility for applying concepts to new situations" (Webb and Grib, 1967); "an enhancement in the motivational aspect in learning" (Webb, 1970); "an increase in the student responsibility" (Beach, 1966; Milton, 1971). The principal advantages which have emerged from the students' evaluations and questionnaires about the discussion procedures have been, "to place more emphasis on understanding than in memorization", "to clarify the students' own ideas", "to promote a more active role in learning", and "to increase the interest in the subject matter of the course" (Webb, 1973).
The discussion procedures have also been implemented as a partial component of contingency managed college courses. Efforts have been directed to validate through empirical data the effectiveness of such procedures. However, when students' quiz performances have been compared with those of students who were not exposed to the discussion procedure, no important differences have been found (Kalott and Rollofson, 1972; Ellis, 1974). In the first study, the aim was to generate critical analysis of "scientific" articles. Discussion groups of four students each, were required to identify the attitude of science which was violated in a specific article. The students were provided with a list of possible violations to four attitudes of science. Their participation during the daily discussion was graded by the other group members according to a detailed outline. The effect of such discussion was then evaluated on their performance on a daily conceptual quiz. The conceptual quiz required the use of the attitudes of science. These students' performances on their final exam were compared with other students' performances who were not involved in the discussion. In the second study, efforts were directed to the generation of original examples of psychological principles. The discussion group was divided into pairs of students. Both members of each pair worked cooperatively to answer a quiz which required them to generate such examples. No interaction was permitted between members of different pairs during the discussion. Their discussion was indirectly monitored by checking their written answers of every
pair. Their performances on a mid-term and final exam were the compared with those of groups of students who were not exposed to such a procedure.

The present study was performed with the aim of designing and validating a discussion procedure in which: 1) an assistant could directly monitor the students' discussion; 2) a special point system might contribute by specifying the type of students' participation and their consequences; 3) a daily multiple-choice quiz was implemented which would cover the same material as that previously discussed; and 4) the discussion was mainly directed to clarify the students' questions about the daily assigned material.

Experiment I used an intra-group design to: 1) assess the effectiveness of a special point system for increasing and maintaining the students' participation during the daily discussion session; and 2) evaluate the possible effects of such discussion procedure in students' daily quiz scores.

EXPERIMENT I

METHOD

Subjects: A group of 19 college students enrolled in one section of the introductory psychology course at Western Michigan University. In order to facilitate the functioning of this course all the enrolled students were divided into small sections of approximately 20 students each.

Procedure: The students attended classes every day (Monday to Thursday)
from 1:00 to 1:50 p.m. The general course policies and procedures are described in detail in "My Behaviordelic Friend" (Malott et. al., 1974). The main characteristics in terms of scheduled activities during classroom time were:

from 1:00 to 1:15: Discussion over the daily assigned material
from 1:15 to 1:30: Quiz over the assigned material
from 1:30 to 1:50: Rat laboratory exercises.

The study was performed during the first fifteen minutes of the class period.

Baseline: During this phase, the students were allowed to ask questions over the assigned reading material and to answer their classmates' questions. If there were no questions, the students were instructed to review their study objectives and notes until the fifteen minute period elapsed.

Each instance of student participation (every question or answer) was recorded without any teaching apprentice's (proctor's) comment. The percentage of students participating was computed by dividing the number of students participating by the total number of students attending class that day. The students' grades on their daily quizzes were also recorded, and the daily mean grade was computed.

Reliability of Recording: The teaching apprentice and an assistant simultaneously but independently recorded each students' participation during the discussion session. The assistant was present once a week throughout the experiment. Reliability was computed by dividing
the smaller number of recorded participations by the greater number and multiplying by 100.

In order to discriminate whether or not a question was "easy", the list of study objectives for that day was used. Those questions which were just read from the objectives were defined as "easy". The reliability of this recording was assessed and computed in the same way as the students' participation.

Experimental Phase I: At the beginning of this phase, a paper was handed out to the students with a partial description of the procedure. It informed them that they would be able to obtain a weekly total of 10 points by participating during the discussion period. (Those ten points were previously obtained by correctly answering a five-item, TV quiz every week). These 10 points were distributed as follows:

- the first question or correct answer received four points,
- the second question or correct answer received two points,
- the third question or correct answer received two points,
- and the fourth one received two points.

Each student was required to raise his or her hand in order to be picked for participating. Special attention was focused on the procedure for selecting the students. They were picked according to the total number of points they had accumulated thus far that week; those students with a lower number of points were selected first. The teaching apprentice immediately recorded the student participation by putting a mark on a sheet with the students' names and location in the classroom.
During Experimental Phase I, an evaluation sheet concerning the discussion period was filled out by the students. Among the most important features found in that evaluation was the students' consideration that "sometimes they had to ask silly questions just to get points." This also was observed by the teaching apprentice and the assistant. For this reason, Experimental Phase II was put into effect at the beginning of session 17.

**Experimental Phase II:** At the end of session sixteen, a graduate assistant notified the students of the main result of their evaluation of the discussion period. He then read a paper (which had been previously handed to the students), and which contained the following points:

1) "Those students who just read the questions from the objectives (these kind of questions had been previously defined as 'easy questions'), will be required to give a tentative answer or explanation to the question they are asking in order to get the points."

2) "Points will be given for commenting or asking questions about any aspect of the reading material that was not considered part of the objectives."

3) "And points will be given for answering (complete answers or good approximations) to your classmates' questions."

Except for these changes, the rest of the conditions remained the same as those in Phase I.
Experimental Phase III: At the beginning of session 21, the following changes were made:

1) Feedback was provided to those students who continued asking "easy questions" (just reading the objectives without giving any comment or possible explanation). They were informed that their questions did not reach the requirements for getting points.

2) The "easy questions" were answered by the teaching apprentice rather than by other students.

This phase lasted four sessions.

Baseline Reversal: At the beginning of session 25, a similar condition to that in Baseline was implemented. The students were informed that the discussion procedure was no longer going to be in effect, but they were allowed to ask questions, if there was no participation they were instructed to review their study objectives and notes until the end of the 15 minute period.

RESULTS

Seven simultaneous reliability checks were performed by the teaching apprentice and the assistant on the students' participation during the discussion session. An average of 94% agreement with a range from 87% to 100% was obtained. In respect to the "easy questions", three simultaneous reliability checks were performed. An average of 91% agreement with a range from 86% to 97% was obtained.

The daily percentage of students' participation during the discussion period and the daily number of participations are shown in Figure 1 and 2 respectively.
A noticeable increase in both measures is observed as a result of the introduction of the point system in the Experimental Phase I in session five. However, during Experimental Phases II and III, when more elaborate questions were required of the students in order to get the points, a slight decrease in the percentage of students participating is observed (Figure 1). After session 25, when baseline condition was reintroduced (no points for participating), an abrupt decrease in the percentage of student participating and in the number of participations was obtained.

As mentioned before, Experimental Phases II and III were implemented with the aim of dealing with the high percentage of "easy questions", which occurred during Phase I with a mean of 60%. During the implementation of Phase II the mean decreased to 31% and in Phase II a mean of "easy questions" of only 19% was obtained.

With respect to the mean daily grade of the 19 students who participated in this experiment, no important differences were observed through the five different phases.

DISCUSSION

The special grading system implemented during the discussion session was designed with the aim of increasing the reinforcing value of such a procedure by providing points contingent on the students' participation. This grading system demonstrated its effectiveness not only for increasing and maintaining the students' participation, but also for differentially maintaining a more specific type of student question.
As mentioned before, an objective of this study was to validate through empirical data the educational value of the discussion procedure. The students' performance on their daily quizzes was selected as the dependent variable. Significant changes in the students' performances contingent on the introduction and removal of the discussion procedure would be a good indication of such a value. Several variables are postulated for explaining the failure in obtaining significant differences through the different phases. Among the more plausible are:

1) The changes in the complexity and the size of the reading assignment is an important source of variability in the students' daily grades.

2) The students' daily quiz scores were commonly "high", so it was difficult to produce significant changes.

3) There are some students who do not need to attend the discussion session because of their good understanding and mastery of the material.

Experiment II was designed with the aim of partially solving the above mentioned factors.
EXPERIMENT II

This experiment assessed the effects of a special contingency. It was arranged so that only those students of the Experimental Group with a daily average quiz grade lower than 80% were required to attend the discussion session. Another group of students, with no such contingency, was used as the control group. The experimental and control groups' daily average quiz grades were then compared. This comparison was made with the aim of evaluating the possible effects of the discussion, and assessing the daily variability due to extraneous factors. The complexity and size of the daily assigned material were considered to be such variables. An intra-group design was also implemented for evaluating the students' quiz performances. Comparisons were made between those days in which the students attended the discussion session and those days in which the discussion contingency was discontinued. A special grading system similar to the one used in Experiment I was put into effect during this study. Also, more complete lists of study objectives which contained all the relevant material for the quizzes and discussion were used.

METHOD

Subjects: The subjects were 34 college students enrolled in the introductory psychology course during the Spring term of 1974. They were randomly assigned to the experimental and control groups at the beginning of the semester.
Procedure: The two groups of students were in separate classrooms from 10:00 a.m. to 11:50 a.m. every day (Monday to Thursday). The scheduled activities during classroom time were:

**Control Group:**
- from 10:00 to 10:40 TV program.
- from 10:40 to 11:00 Quiz over the TV program and over the assigned material.
- from 11:00 to 11:50 Rat laboratory practices.

**Experimental Group:**
- from 10:00 to 10:40 TV program for students with a "high" cumulative average grade.
- Discussion session for students with a "low" cumulative average grade.
- from 10:40 to 11:00 Quiz over the TV program and over the assigned reading material for students with a cumulative average grade higher than eight. Quiz over the assigned material for students with a cumulative grade lower than eight.
- from 11:00 to 11:50 Rat laboratory practices.

**Experimental Phase I:** At the beginning of this phase, the students in the experimental group were informed of the implementation of a special discussion contingency. Those students with an average daily grade lower than eight out of ten points were required to attend a discussion session conducted in a different classroom. At the beginning of every class
period, those students with a "low" cumulative grade were listed by the assistant who conducted the discussion. The cumulative average grade for each student was computed daily by obtaining the mean of all his quiz scores. The students were informed of the possibility of obtaining a maximum of ten points by participating in the discussion. Those ten points were obtained by the rest of the students by correctly answering a five-item TV quiz every week.

During the discussion session, every student's participation was defined as any question or answer over the assigned material. Two points were given for every instance of participation. When students' participation stopped, the students were prompted to participate by the assistant, who asked questions over the assigned material.

As mentioned before, the students of the control group were not exposed to the discussion procedure; and their scheduled activities remained constant throughout the experiment.

**Experimental Phase II:** At the end of session nine, the students of the experimental group were informed of the discontinuation of the discussion procedure. So, the assistant no longer attended the experimental classroom nor informed them as to who were the students with a "low" cumulative grade. During this phase, the experimental group had the same scheduled activities as the control group.

This condition lasted three weeks.
Experimental Phase III: This phase was performed during a special "Remedial Period". It was conducted for those students with low grades, after the completion of the main part of the course. During this phase, two students from the experimental group and five from the control group were present.

The scheduled activities were the following:

- from 10:00 to 10:50 TV program for the control group and for the students from the experimental group with a "high" average grade.
- Discussion for students of the experimental group with a "low" average grade.
- from 10:50 to 11:20 Quiz over TV program and over the reading assigned material for control group and experimental group with a "low" average grade.

At the beginning of every daily session, these students in the experimental group with a cumulative grade lower than eight were listed by the assistant. After being named, they attended the discussion held in another classroom. The same procedure developed in the discussion session during Phase I was implemented in this Phase.

This condition lasted two weeks.
RESULTS

The daily average quiz scores for the experimental and control group are shown in Figure 3. A mean grade of 8.97 for the experimental group was obtained during those days in which the discussion session was operating (Phase I); the control group's mean grade was 8.58 during the same phase. In contrast, when the discussion procedure and contingency was eliminated for the experimental group (Phase II), the experimental group's mean grade decreased to 8.57; the control group's mean was virtually unchanged (8.59).

The number of students of the experimental group who attended the discussion sessions (those with a "low" average daily grade) during Phase I and II are shown in Figure 4. From all the experimental students, only two were consistently present in all of the discussion sessions. Those two students' mean grades are shown in Figure 5. As we can see, Terry's and Norma's average quiz grades during those days in which they attended the discussion (Phase I) were 8.0 and 7.1. When the discussion procedure was discontinued (Phase II), their average quiz grades decreased to 6.2 and 5.6. During the Remedial Period, when Terry and Norma attended the discussion sessions again, their mean grades increased to 6.7 and 6.3.

DISCUSSION

In this experiment, the discussion procedure was only implemented for those students with a low daily average grade. There were
FIG. 5

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two main reasons for doing this: 1) to have a wider range for evaluating the possible changes in their daily grades; and 2) to separate those students who probably had no questions because of their previous demonstrated understanding of the assigned material.

By evaluating such changes in the students' daily grades, the academic value of the discussion procedure is partially demonstrated. A greater mean grade was observed in the two experimental subjects during those days with discussion (Phase I) than in those days with no discussion (Phase II). The possibility of explaining those differences in terms of the effects of extraneous variables was reduced. This was performed by having a control group and assessing their average grades during the same days. As mentioned before, that a average grade remained constant. However, when the discussion procedure was reintroduced during the Remedial Period, only a slight increase is observed in both students. This might be due to the greater amount of assigned material during this period (3 chapters every day); although those chapters were previously reviewed during Phase I or II.

Even though only part of the students enrolled in the experimental group attended the discussion session, the average grades of the entire group were presented. those averages grades were also compared with the averages grades of the central group. The reason for doing that was based on the postulation of a possible procedural effect besides the discussion itself. This possible effect might be the fact of providing daily information in the
experimental group concerning those students with low average grades. It might be the case that such a procedure became aversive for a specific student because: 1) the rest of their classmates heard about his daily low average grades, and 2) he was isolated from the rest of the group and required to attend a special remedial situation. Although no data were collected in order to validate this postulation; the suggestion is made for future research directed to students with low grades.

This study was directed to provide empirical validation of a special discussion procedure for improving the academic performances of students with low grades. The implementation of this procedure will be worthwhile if it is considered important to increase the students' low grades by at least one letter grade. Even more, it is felt that more significant academical improvements might be produced by solving certain details in the discussion procedure. An important factor to be considered is the implementation of mechanisms which contribute to the establishment of positive attitude toward the discussion procedures.
REFERENCES


