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AUTHOR Casteel, J. Doyle; Gregory, John W.
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ABSTRACT

This study was designed to investigate the degree to which skills may be learned and practiced through microsimulation and then used under microteaching conditions. This investigation was conducted to determine the following: (a) if preservice teachers who have acquired and practiced complex teaching skills through microsimulation employ these skills when placed in a microteaching situation, and (b) if these acquired skills are used functionally. Subjects for the study were 12 preservice social studies teachers. Results of the investigation indicate that those subjects who participated in this study employed four moves they practiced in a microsimulation setting in a microteaching situation. The practice moves include the following: (a) structuring moves, which provide a context within which discussion is to be focused; (b) conditional moves, involving a given premise and a following consequence; (c) wait-time moves, involving teacher utilization of silence; and (d) indicative moves, involving teacher responses which relate directly to student utterances. Eight variables were used to compare the first microsimulation with the microteaching situation. Subjects changed significantly from pretest to posttest on all variables in the directions hypothesized. The results also indicated that teachers may acquire, practice, and learn to use a cluster of technical teaching skills functionally through microsimulations of teaching. (Author/JS)

A CLUSTER OF TECHNICAL TEACHING SKILLS - ACQUISITION THROUGH MICROSIMULATION AND EVALUATION THROUGH MICROTEACHING

J. Doyle Casteel
Associate Professor

and

Jonn W. Gregory
Assistant Professor

Department of Secondary Education
and
Institute for Development of Human Resources
University of Florida

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INTRODUCTION

For the last ten years, there has been an effort to develop constructs related to the cognitive dimensions of teaching behavior. The elusive objective sought has been a set of "variables representing manipulable conditions" that are "highly trainable" and related to pupil achievement (Travers, 1971). The research suggests that teaching skills related to instructional ends may best be considered by looking at sequences and combinations of skills rather than focusing on skills as isolated entities.

The study and analysis of combinations of teaching skills in natural classroom settings has been difficult. There have been two major problems. Elements of teacher behavior have been dropped from analyses because of their infrequent occurrence. Also, it has been difficult to determine the degree to which teachers found employing skills did so purposely. These problems have been compounded by the limited number of studies in which teaching skills were investigated in combination with one another. Such problems as these have led serious reviewers and critics of teaching research to suggest that investigators create samples of teachers, deliberately trained to use sequences and combinations of skills, in order to identify effective teaching behaviors.

Two of the means by which teachers may acquire and practice the use of teaching skills are microsimulation and microteaching. In microsimulation, participants learn and practice instructional skills by teaching three or four of their peers. In microteaching, participants learn and practice instructional skills by teaching four or five students within the age limits of the group they hope to teach after certification.

Microsimulation is easier to arrange but is not as highly valued as microteaching, since the latter is perceived as real teaching (Allen and Ryan, 1969). The study to be reported was designed to investigate the degree to which skills may be learned and practiced through microsimulation and then used under microteaching conditions.

THE PROBLEM

This investigation was conducted in order to seek answers to the following questions:

1. Given a group of preservice teachers who have acquired and practiced complex teaching skills through microsimulation; do they continue to employ these skills when placed in a microteaching situation?
2. If these teachers continue to employ the skills acquired, do they use the skills functionally? (If skills are used in order to obtain an observable student performance or in order to obtain an observable class of student performances, then skills are used functionally.)

DEFINITIONS

The variables selected for this study were skills associated with structuring moves, conditional moves, wait-time moves, and indicative moves. During this investigation, these moves were defined as follows:

Structuring moves provide a context within which discussion is to be focused. Structuring moves occur

. . . if the teacher provides or re-establishes set for a lesson.

. . . if the teacher talks in order to provide a context within which students are to understand an explanation, a set of directions, or a question.

. . . if the teacher closes a lesson or a phase of a lesson by reviewing what has occurred and relates this review to what is to occur in the next phase of the lesson.

. . . if the teacher uses a hypothetico-deductive move (Suppose . . . . If . . . then . . . .) in order to ask students a question.

Conditional moves are utterances which follow the linguistic paradigms associated with conditional logic. A condition premise is given and a consequent follows or is to be supplied. Conditional moves occur

. . . if the teacher cues students that he is about to engage or is engaged in structuring, e.g., Let's say; Let's suppose; Let's pretend; or Let's assume.

. . . if the teacher links what he has said to a conclusion he draws, e.g., If; When(ever); Given; In order to; and Supposing.

. . . if the teacher links a context he has provided to a question to which students are to respond.

. . . if the teacher links praise, encouragement, or criticism to criteria on which the praise, encouragement, or criticism is based.

Wait-time moves refer to the use of silence. According to conventional usage, the period of silence must be three seconds or longer in order to be classified as wait-time move. Wait-time moves occur

. . . if the teacher delivers a question or a direction to students and waits silently until they organize and make a response.

. . . if the teacher waits after an initial student response in order that the responding student (or other students) may continue to develop the initial response.

. . . if the teacher waits after an interaction in order to organize his reaction (indicative moves, defined below); or in order to determine how he will launch the next interaction or activity (structuring moves, above).

. . . if the teacher pauses and then continues while he is in the process of using structuring, conditional, or indicative moves.

. . . if the teacher remains silent after asking students to perform seat work; or. while writing on the blackboard or an overhead transparency.

Indicative moves are teacher responses which relate directly to student utterances. They are generally used as a form of feedback mechanism. Indicative moves occur

. . . if the teacher uses multiple reinforcement (e.g., "That's a good point. A very useful suggestion").

. . . if the teacher repeats what a student has said and praises the student's contribution.

. . . if the teacher uses a verbal marker of importance (e.g., "We'll want to be sure and remember this possibility . . . .").

. . . if the teacher praises or encourages a student response and provides a basis for his praise or encouragement.

. . . if the teacher integrates a student's response or students' responses into a lesson that is being taught.

. . . if the teacher reviews a number of student responses citing by name the students who made individual contributions.

. . . if the teacher uses differential reinforcement in order to point out (indicate) the merits and demerits of a student's or a group of students' idea.

. . . if the teacher uses minimal criticism (e.g., "Wrong;" "No;" and "Incorrect").

RELATED LITERATURE

Literature related to structuring, conditional, wait-time, and indicative moves provides a rationale for selecting these instructional skills. Investigations have been reported to the effect that structuring moves, conditional moves, wait-time moves, and indicative moves are related to student classroom behaviors (process variables), to student growth or achievement (product variables), or to both process and product variables. Investigations have been reported to the effect that these are manipulable skills that may be acquired by trainees. A number of investigators have reported data suggesting that these skills tend to cluster, i.e., teachers who employ one of the four instructional moves, as defined, are likely to employ one or more of the other moves as well.

Relationship to Student Outcome Measures*

Structuring moves. Bellack, Kliebard, Hyman, and Smith (1966) analyzed the behavior of fifteen experienced social studies teachers, all of whom taught a four-day unit using the same content source. A criterion test was administered to all students on the fifth day. On the basis of class performances, three were identified as "significantly high" and five as "significantly low". They reported a "notable tendency" in the classes judged significantly low to deviate from the means with respect to structuring moves. This lead to the speculation that a moderate amount of teacher structuring preceding teacher soliciting is related to student achievement.

A second analysis of these same fifteen classes by Furst (1967) led to the finding of higher ratios of analytical and evaluative questions to empirical questions asked by teachers in the three highest achieving classes. It was reported that these same teachers tended to use a moderate amount of structuring.

Soar (1966) utilized process and product measures in fifty-five classrooms (grades 3-6) for a year. He found a significant and positive relationship between continuous teacher lecture and student achievement. When he analyzed this finding by reviewing the original codings, Soar found that teachers in the highest achieveing classes were lecturing for nine-to-eighteen econds immediately prior to asking a question (personal communication: summer, 1972).

Schuck (1968) used a sample of eighteen preservice science teachers to study the effects of training teachers to use set-induction. Nine Ss were trained to use set-induction and taught two-week biology units. Using a criterion test developed for the study, Schuck found that students who studied with teachers trained to use set-induction achieved significantly more than did students who studied with teachers who were untrained.

Rosenshine (1971) reviewed a study conducted by Fortune (1967) in which the instructional skills used by 42 teacher trainees were analyzed. Each teacher taught four lessons ten to fifteen minutes in length to fourth, fifth, or sixth graders. Student achievement was determined by an adjusted criterion test score. Introductions using "instructional sets" discriminated significantly between high and low achieving social studies classes.

Wright and Nuthali (1970) studied seventeen Standard Two (third grade) classes in New Zealand. Six classes were taught by experienced teachers; five were taught by student teachers who had almost completed a teacher training program; and six were taught by student teachers who were just beginning a teacher training program. Each teacher taught the same four-day unit. Student achievement was measured by a posttest-only criterion test that was adjusted in order to yield residual class mean gain scores. Wright and Nuthall found that while prequestion structuring was not related to student achievement, post question-structuring was negatively related to student achievement.*

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*If the teacher, at first, asks, and then explains what is meant by a question, post-question structuring occurs. If the teacher, at first asks and then provides a contextual situation within which the question is to be understood post-question structuring occurs.

These findings suggest that if structuring is to be provided, it should occur before a question in order to avoid post question structuring.

Conditional moves. Rosenshine (1968; 1971) analyzed the relationship between teacher use of "explaining links" and student achievement. Three fifteen minute lectures delivered on three contiguous days constituted the source of his data. On the first day, forty twelfth grade social studies teachers prepared and delivered a fifteen minute lecture based on and limited to an article about Yugoslavia found in the Atlantic Monthly. On the second day, the same teachers prepared and delivered a fifteen minute lecture based on and limited to an article about Thailand found in the Atlantic Monthly. On the third day, a cassette recording of a fifteen minute lecture about Israel, again, based on and limited to an Atlantic Monthly article, was played. Immediately after each of the three lectures, students responded to a ten item criterion test. The residual gain score for each class was used in order to select thirty lectures for further analysis -- five high and five low lectures for Yugoslavia, Thailand, and Israel. As part of his analysis, Rosenshine determined the frequency of explaining links -- words and phrases such as "because", "in order to", "if . . . then", "therefore", and "consequently" as well as specified instances of words and phrases such as "since". Rosenshine found that the highest scoring lectures contained significantly more ($p < .01$) of these words "per lecture, per minute, and per hundred words" (1968, p. 289).

Gregory (1972) investigated the relationship between conditional moves and student growth in logical reasoning ability. Pre- and posttests were administered five months apart to students in twenty seventh grade mathematics classes using the Cornell Conditional Reasoning

Test. Five lessons were recorded and transcribed for each of the twenty teachers whose students were tested. Analysis of the transcripts led to the frequency with which teachers used conditional moves -- "a statement or question in which a condition is given and a consequence follows or is to be supplied" (p. 3). Using the mean of the five lessons so coded, two groups of teachers were identified; the five teachers who employed the highest mean frequency of conditional moves and the five teachers who used the lowest mean frequency of conditional moves. It was found that students who were members of classes in which teachers used a high frequency of conditional moves grew significantly more in logical reasoning ability than did students who were members of classes in which teachers used a low frequency of conditional moves.

Gregory and Casteel (1974b) replicated Gregory's original investigation using nine eighth grade mathematics and four social studies teachers. It was found that membership in a mathematics class in which a teacher uses a high frequency of conditional moves is related to student growth in logical reasoning ability. Social studies teachers who used a high frequency of conditional moves secured more student statements associated with value clarification ; however the relationship between conditional move utilization and student growth in logical reasoning ability was negative ($r = -0.90$).

Based on his analysis of explaining links, Rosenshine identified conditional words which he saw functioning to establish the limits of what a speaker is saying. Using Gregory's procedures, two functions of the conditional move have been identified (Gregory and Casteel, 1974a). In the lecture mode it cues students to the context within which an explanation, direction, or question is to be discussed. In the inquiry mode it serves as a link between the context provided and questions or consequences regarding the context. If the phenomena classified by Rosenshine and Gregory are the same, then the conditional move is related both to twelfth grade student comprehension of content from lecture and to seventh and eighth grade student logical reasoning ability.

Wait-time moves. Rowe (1972; 1973) analyzed seventy-four tape recordings of sixteen elementary school teachers and seventy-six tapes of microteaching lessons taught by seventy-six teachers in an effort to relate wait-time to student process variables. All Ss had achieved criterion wait-time, i.e., they could wait for three to five seconds after asking a question for a student response and after initial student responses. It has been reported that with achievement of this skill a concomitant change in nine student behaviors occurred:

> 1. The length of student responses increased. . . . . 2. The number of unsolicited but appropriate student responses increased. . . . . 3. Failure to respond decreased. . . . . 4. Confidence as reflected in fewer inflected responses increased. . . . . 5. The incidence of speculative thinking increased. . . . . 6. Student-student comparing increased. . . . . 7. More evidence followed by or preceded by inference statements occurred. . . . . 8. The number of questions asked by children increased. . . . . 9. Slow student contributions increased.

Rowe valued these process outcomes, arguing that they add up to a pattern student behavior congruent with scientific inquiry.

Lake (1973) studied a number of the relationships reported by Rowe experimentally. Seventy-two fifth grade students were randomly assigned to eighteen microteaching groups. These four-member groups were then randomly assigned to nine experimental and nine control groups. Students assigned to the experimental group were taught under long wait-time conditions (i.e., an average of three or more seconds). Lake reported the following findings for the experimental treatment:

(1) students increased the number of conversational sequences they employed; (2) students increased the number of alternative explanations they suggested for given events; (3) students asked to respond to a factual question responded appropriately, initially, but moved voluntarily from fact stating to the more cognitively complex behavior of explaining; (4) students asked to respond to an opinion question responded appropriately, initially, but then moved voluntarily to the more cognitively complex behavior of evaluating; and (5) students tended to speculate more and to engage in more arguments.

Furst (1967), cited above, reported that silence (or confusion) occurred more frequently in high achieving twelfth grade social studies classes. If one presumes that the high achieving teachers studied by Furst were using contiguous three second intervals of silence, she related wait-time to process and product variables. This inference appears to be warranted on the basis of a later study by Gregory and Casteel (1974b), cited above. Gregory and Casteel found that wait-time was significantly related to student growth in logical reasoning ability.

Indicative moves. Using a sample of thirty sixth grade teachers, Morrison (1966) analyzed the relationship between extended teacher praise (lasting more than three seconds) and student achievement and the relationship between extended teacher acceptance or use of student ideas and student achievement. Results indicated that students of those teachers ranked high in their use of extended praise had greater achievement gain scores as compared with students of teachers ranked low in their use of extended praise. Morrison also found that students who were ranked high in their extended use of student ideas achieved more than did students of teachers who were low in the extended use of student ideas.

Bellack (1966), cited above, reported that teachers in the five "significantly low" classes reacted to student statements by making content-related statements themselves more often than did teachers in the three "significantly high" classes. In contrast, teachers in the three "significantly high" classes reacted to student statements "rating the truth or falsity" or "the appropriateness or inappropriateness" of what students said more often than did teachers in the "sign   ntly low" classes.

When Furst (1967), cited above, reanalyzed data collected by the Bellack group and coded the teachers they had studied, using the observation system devised by Flanders, she found that the three "high achieving classes" were characterized by more praise than were the four "low achieving classes". It was also found that the three "high achieving classes" were characterized by more teacher use of student ideas than were the four "low achieving classes".

Sears (1963), as reported by Rosenshine (1968), studied seven fourth and fifth grade teachers. Ten full mornings were tape recorded, five during the fall and five during the spring. A behavior that involves the acceptance and use of ideas was found to be stable:

> Giving intellectual consideration to possibilities, expanding amplifying, relating to other activities, alternatives.

Using residual gain scores, Sears found that this behavior was related to the gain of "superior" boys.

Soar (1966), previously cited, found that a factor that included "teacher encourages interpretation, generalization, solution", was related to pupil growth in arithmetic concepts.

Hughes (1973), studied the effect of teacher reactions to student responses in two form II (seventh grade) New Zealand classes on student achievement. For purposes of measuring student learning, Hughes developed a criterion test and used residual gain scores. One of two treatments was assigned to intact classes. Following the treatment, the [illegible] s of students in each class were coded and analyzed. Hughes found that:

> Pupils in the reacting group received frequent praise for correct answers, were supported when incorrect answers were given, but were urged or mildly reproved when the situation warranted. By contrast, pupils in the non-reacting group generally received little more than a statement of the correct answer (p. 33).

Using residual gain scores from criterion testing of pupils, it was found that the group receiving teacher reactions

> scored higher than the no reacting group on the posttest items relevant to the lesson questions they responded to and were given positive reactions for, and on the posttest items not relevant to these questions, (p. 33).

This latter effect suggested to Hughes that

> the increase in achievement of the reacting group over the no reacting group appears to be the result of the generalized effect of positive teacher reactions and not the reinforcement of particular pupil responses, (pp. 35-36).

Fortune (1967), previously cited, found that high achieving social studies teachers used review and repetition more frequently than did low achieving social studies teachers.

Pinney (1969), used a sample of fifty-four preservice English and social studies teachers in order to search for verbal correlates of effectiveness in explaining. Each S taught two preset lessons -- one in June prior to training and a second in August. Residual gain scores on criterion tests were used to measure effectiveness. On the basis of adjusted tested scores, comparisons were made between the eight teachers who were most effective in explaining and the eight teachers who were least effective in explaining for each sample and for the total group. The three behaviors found to discriminate between "high" and "low" teachers' were "verbal markers of importance", "verbal markers of importance used in proximity to distributed or massed repetition", and the "percent of multiply-reinforced responses". Pinney also reported the Ss found using one of these behaviors tended to repeat student statements in conjunction with the use of the three behaviors that discriminated between "high" and "low" teachers.

Gregory and Casteel (1974b), cited above, found that multiple reinforcement (indicative move events) were also related to student growth in logical reasoning ability.

The studies reviewed here are summarized below. A number of investigators have reported relationships between structuring and indicative moves and student outcome measures. Of those who have analyzed structuring, only Bellack counted conditional moves (conditional inferring) and he did not seek relationships between this move and class achievement means. Rosenshine wanted to investigate relationships between "advance organizers" (Ausubel, 1963) -- a form of structuring -- and student gain on comprehension tests but advance organizers were not found in the lectures teachers delivered. Gregory and Casteel

Investigators Reporting a Relationship Between a Move and Student Outcome Measures

MOVES			
Structuring	Conditional	Wait-Time	Indicative
Bellack Furst Soar Schuck Fortune Wright and Nuthall	Rosenshine Gregory Gregory and Casteel	Rowe Lake Furst Gregory and Casteel	Bellack Furst Soar Sears Fortune Pinney Wright and Nuthall Gregory and Casteel

(1974b), found that conditional, wait-time and indicative moves were related to student growth in logical reasoning ability in mathematics classes and that wait-time and indicative moves were related to student growth in logical reasoning ability in social studies classes. These moves are known to incorporate discrete behaviors that teachers may acquire and use.

Manipulability of Skills

Structuring moves, conditional moves, wait-time moves, and indicative moves are manipulable in that they may be acquired by trainees. Training programs that have been reported may be used in order to help preservice or inservice teachers acquire these skills. Schuck (1968), trained preservice teachers to use instructional set. Gregory and Casteel (1974a) trained preservice teachers to use conditional moves. Rowe (1972), trained 76 of 94 teacher volunteers to use criterion wait-time. McDonald and Allen (1967), trained preservice teachers to use a range of reinforcement behaviors (indicative moves).

The manipulability of these skills is important from at least four perspectives. First, one might control the frequency and placement of particular moves or skill events in order to study the function of particular skills or skill events in classroom discourse. Second, one might combine skill and events in order to explore the impact of these combinations on process variables. Third, one might attempt to model these skills configuratively in order to conceptualize how skills and skill events complement one another. Fourth, one might create populations of teachers, all of whom use the four skills functionally, in order to study the relationships between different combinations of skills and student process, student achievement, and student growth variables.

Relationships Among Moves

Data has been reported suggesting that structuring moves, conditional moves, wait-time moves, and indicative moves complement one another.

Twenty mathematics teachers known to differ significantly with regard to their use of conditional moves (Gregory, 1972; previously cited) were coded using the teacher-centered categories of the Social Science Observation Record (Casteel and Stahl, 1973). Each line of transcript was coded as an interval of teaching and a matrix of ordered pairs constructed. Using step-wise regression analysis, it was found that two ordered pairs associated with prequestion structuring accounted for 89 percent of the variance between teachers who were high and teachers who were low in the frequency with which they used conditional moves (Casteel, Gregory, and Koran, 1974). These two ordered pairs were teacher "commentary statements" followed by teacher "commentary statements" and teacher "commentary statements" followed by "teacher interrogative statements".

Koran, Shea, and Roy (1973), trained preservice science teachers to criterion wait-time. Nineteen tapes were randomly selected and coded on a three second interval basis, using the Social Science Observation Record (Casteel, Gregory, Koran, 1974). It was found that the frequency of two successive teacher commentary statements, a behavior consistent with structuring, was positively and significantly related to wait-time moves (r=.46 for both frequency and percentage).

The latter finding is consistent with a finding reported by Garigliano (1972). Garigliano used microteaching procedures and attempted to train eleven elementary (K-5) teachers to use wait-time.

Although he was unsuccessful, he reported that his Ss used three distinct patterns of discourse.

One group of teachers used an instructional pattern of discourse when asking questions:

"John, do you agree with that?"

The mean after question wait-time for this group was 0.0 seconds.

A second group of teachers utilized a post-question pattern of discourse:

"Well, what did you change? Explain to me Ellen."

The mean after question wait-time for this group was 0.5 seconds.

A third group of teachers employed a prequestion structuring pattern of discourse:

> "All right now, that is the relation to ah, position and direction from Mr. O. All right now let's take this block of wood and take a look at it. See what I'm doing with it? All right, am I changing its position?"

The mean after question wait-time for this group was 3.48 seconds.

McDonald and Allen (1967), used modeling and feedback procedures in order to increase the freqency with which Stanford interns used probing questions. As a side effect of such acquistion, Ss increased the freqency of "Intern Repeats Pupil Responses" -- an indicative move skill event. Their reaction to this finding follows:

> This was surprising because the experimenters' sets about this variable was that it would occur frequently during the pre-session tests (teaches), and if not extinguished or suppressed during training, would tend to "crowd-out" Probing responses. They were quite wrong on both counts. Intern repeats were found to be more highly correlated with Probing (.65) than with Non-Probes (.35), and response strength increased significantly from Session One (teach 1) to Session Three (teach 3), rather than decreasing.

Ohrme (1968), used microteaching techniques in order to study the effects of modeling and feedback variables on the performance of Stanford interns acquiring probing moves. As was the case with McDonald and Allen, Ohrme sought to extinguish or suppress teacher repeats. Ohrme also found both a significant increase between microteach 1 and microteach 3, and a significant and positive correlation between teacher repeats and probing moves ($r = .64$).

Pinney (1969; previously cited) reported that the three behaviors that discriminated between high achieving and low achieving teachers -- "verbal markers of importance", "verbal markers of importance used in proximity to distributed or massed repetition", and the "percent of multiply-reinforced responses" -- tended to be used by those teachers who repeated student statements in conjunction with these discriminating behaviors.

Rowe (1972; previously cited) found that the training in use of wait-time resulted in a change in the types of questions teachers ask. More particularly, she reported a significant increase in probing questions (from 2% to 28%) and a decrease in informational questions (from 82% to 34%). In contrast, Lake (1973; previously cited) found that when wait-time was used, a number of probing questions became redundant, i.e. students, given wait-time, elaborated, interpreted, and justified initial responses before they could be solicited to do so. This apparent inconsistency could be interpreted as meaning that teachers who "know how" to use wait-time and probing, wait after an initial student response; if, after a period of silence, the student fails to clarify, relate, or justify, the teacher uses probing moves to secure the behavior.

The relationships cited here suggest why critics of teaching research have concluded that the best explanation of teaching effectiveness is most likely to be found by combining these moves and preparing teachers to use the moves and elements configuratively. Wright and Nuthall (1970; cited previously) combined a number of skills employed by the New Zealand teachers they studied:

> percent of solicitations which were closed; terminal structuring as a percent of total structuring, lines of revision as percent of total lines, number of utterances containing only one solicitation; number of questions redirected to another pupil; and frequency of thanks and praise. (p. 488)

Using multiple regression analysis, Wright and Nuthall found that about 79 percent of the variance in residual achievement (class means) was accounted for by the selected teacher behavior variables.

These findings are congruent with the findings reported by mathemagenic learning theorists (Rothkopf, 1966; 1970; Anderson, 1970). Mathemagenic learning theorists have found that when a child is helped to attend, to segment, to translate, and to process information his performance is superior to that of a child who is not so assisted. Although mathemagenic learning theorists have stressed the mediation of learning through written materials, the teacher may complement written mediation or even serve as the mediating source of knowledge. This possiblilty has been mentioned by Anderson, (1970). Structuring moves, it might be argued, could help students to identify critical elements in a learning episode or series of episodes. Conditional moves could help students to translate information, conceptual criteria, and principles into their own words and frames of references and could provide them with a model that they may employ. Wait-time (and probing) moves could help students to process (i.e., to play) with the potential meanings of what they are learning by providing time for students to reflect and by cueing them that the results of such reflection are to be shared. Indicative moves could provide students with constant monitoring against which they can assess their performance as students and could isolate the information, knowledge, and skills they are expected to learn.

Rosenshine (1971), has suggested that researchers seek combinations of skills, utilized functionally, that are related to student process and product variables. The literature reviewed here suggests that no single skill is likely to discriminate consistently between successful and unsuccessful teachers. In the natural classroom setting, the investigator may not find significant relationships; teachers high on variable X and low on variable Y may not be significantly different from teachers low on variable X and high on variable Y.

It is unlikely that a sample of teachers who use the five skills presented here could be found in a natural setting. Consequently, the study and analysis of relationships between student skill configurations growth and learning, would require that investigators train, in effect create, a sample of teachers who could and would employ the skills learned functionally. The first step in such an endeavor would be to determine whether or not a program of training could be developed which would create such a sample.

HYPOTHESES

For purposes of testing, the two questions at the focus of this study were cast as hypotheses:

Hypothesis 1: Ss will grow significantly from pretest to posttest as measured by

a. an increased frequency of verbal teacher variables associated with structuring;

b. an increased frequency of verbal variables associated with wait-time;

c. an increased frequency of conditional moves; and

d. an increased frequency of indicative moves.

Although the major purpose of this investigation was to determine whether or not preservice teachers could be trained to use a cluster of skills functionally, it was necessary to establish a population known to have acquired the skills.

Hypothesis 2: Ss assigned to teach lessons that require divergent patterns of classroom discourse will obtain significantly different patterns of student verbal response as follows:

a. Ss directed to secure lecture-reaction and recitation patterns will obtain a greater percentage of student verbal behavior consistent with this pattern of classroom discourse than will Ss instructed to secure a value clarification pattern of discourse; and

b. Ss directed to secure a value clarification pattern of student response will obtain a greater percentage of student verbal behavior associated with this pattern of discourse than will Ss assigned to secure lecture-reaction and recitation patterns of classroom discourse.

These hypotheses were teated using an apriori alpha risk of .05.

METHOD

Subjects

Twelve pre-service social studies teachers enrolled in a nine-hour methods course constituted the sample. Eleven Ss were undergraduates majoring in one of the social sciences. The twelfth S was an arts and sciences graduate who was meeting teacher certification requirements.

Training and Microsimulation

Preparation. Ss received eight hours of instruction concerning the Social Science Observation Record (Casteel and Stahl, 1973; 1974); learned criteria whereby they could discriminate instances of structuring, conditional, wait-time, and indicative moves; analyzed videotapes in order to study how technical skills function in the verbal environment; viewed acquisition tapes containing instances of structuring, conditional, wait-time, and indicative moves; and practiced combinations of these moves using simulation games. All Ss performed successfully on a criterion test indicating that they had learned the definitions, functions, and category numbers of the SSOR and that they could interpret data organized in the SSOR matrix by using cell utilization and sub-matrices. Information concerning the categories, the realms and the sub-matrices of the SSOR is appended.

Microsimulation. The twelve Ss were organized into four peer groups. Each S prepared and taught four lessons to three of his peers. Immediately after each simulated teach, the S who had taught, and his peers, viewed a videotape replay with the principal investigator providing prompting, differential, and confirmation feedback. This sequence was continued until all members of a peer panel had taught a lesson of fifteen to twenty minutes duration, viewed a videotape replay of his lesson, and received feedback. At the conclusion of each session, Ss were given SSOR data for their lesson and instructed to organize a matrix in order to interpret the degree to which they had achieved their objectives. Microsimulations were conducted in the evening and tended to last about five hours. All Ss taught four microsimulation lessons as described.

Assignment to Microteaching Treatments

Following the four microsimulation sessions, Ss were randomly assigned to two member teams. Each team was randomly assigned to teach a high school (eleventh graders) or a middle school (eighth graders) group of students.

Each team was instructed to plan jointly and teach a two-phase lesson. During the first phase, a concept and verbal information relevant to a concept were taught (e.g., alienation) by one of the two Ss assigned to a team. During the second phase, a value clarification discussion based on the concept taught by the first S in a team was led by the second S in each team. The decision as to which S would teach each phase was determined immediately prior to the microteaching session by the flip of a coin.

Instrumentation

Variables of interest were measured through the application of three instruments -- the Social Science Observation Record (Casteel and Stahl, 1973a; 1973b); conditional move coding protocols (Gregory, 1972); and indicative move coding protocols (Casteel, 1974). Between observer and intra-observer reliability coefficients for the realms, categories, sub-matrices, and segments of the Social Science Observation Record were consistently 0.72 or higher (Scott, 1955). The percentage of agreement between independent coders for conditional moves and indicative moves was consistently 90 percent or higher. Data for the first microsimulation were used as a pretest and data for the microteach were used as a posttest.

RESULTS

This study required two analytical phases. First, it was necessary to determine that Ss taught to use structuring, conditional, wait-time, and indicative moves through microsimulation continued to use these skills during a later microteaching experience. In order to make this determination, the first microsimulation was used as a pretest and the microteach was used as a posttest. Data with regard to six SSOR variables and two sign systems are found in Table 1.

Structuring Variables

Intervals of teacher commentary statements followed by contiguous intervals of commentary statements are displayed in the 7-7 cell of the SSOR matrix. Intervals of commentary statements followed by questions are displayed in the 7-9 cell of the SSOR matrix. These teacher behaviors have been related to pre-question structuring (Soar, 1966) and to conditional move frequency (Casteel, Gregory, Koran, 1974). Ss increased the frequency with which they used these behaviors from the first microsimulation to the microteach ($p < .05$).

If a teacher asks a question and then uses commentary statements to explain his question, this occurrence is displayed in the 9-7 cell of the SSOR matrix. If Ss had become more adept at structuring and using wait-time, a decrease in the 9-7 cell from pretest to posttest was to be expected. Post-question structuring decreased from the first microsimulation to the microteach ($p < .05$).

The frequency with which Ss obtain immediate student responses to their questions tends to increase as students acquire hypothetico-deductive structuring skills (Gregory and Casteel, 1974). All student responses to teacher questions in the Subject-Centered or Man-Centered realms of the SSOR comprise the 9-SR variable. The frequency of 9-SR behavior increased from the first microsimulation to the microteach ($p < .05$).

Wait-time Variables

If a teacher asks a question and then waits silently for students to respond, this behavior is displayed in the 9-16 cell of the SSOR matrix. If, following a period of silence, students express statements that are categorized as instances of the Subject-Centered or Man-Centered realms the data is displayed in the submatrix K of the SSOR matrix. All instances of this occurrence comprise the 16-SR variable. For Ss who had learned to use wait-time, the frequencies of these two SSOR variables were expected to increase. The frequency of the 9-16 variable and that of the 16-SR variable increased from the first microsimulation to the microteach ($p < .05$).

Conditional and Indicative Variables

It was also expected that students who had acquired conditional (COND) and indicative (IND) moves would increase the frequency with which they used these moves from the first microsimulation to the microteach. This increase did occur ($p < .05$).

In the second analytical phase, it was necessary to determine that Ss who had learned to use instructional moves under microsimulation conditions could employ the skills so learned to achieve predetermined student behaviors in a microteaching situation. In order to make this determination, four SSOR variables were used (submatrices D, F, and I; and Realm III). Data for these variables are presented in Table 2.

It was predicted that the S in each team assigned to teach the concept instructional phase of the lesson (Treatment A) would obtain more student behavior in submatrix D than would the S assigned to teach the value clarification phase of the lesson (Treatment B). Ss assigned to Treatment A were expected to talk in bursts of twenty or more seconds, periodically interrupting their talk in order to ascertain that students understood what was being said. While teaching verbal information, Ss assigned to Treatment A were expected to ask short questions and obtain short content-related student responses. Both anticipated patterns of response for Treatment A teachers result in student verbal responses that are displayed in submatrix D. Five of the six Ss assigned to teach the first phase of a lesson secured a higher percentage of submatrix D than did the other Ss assigned to the teams. For all Ss, those assigned to Treatment A obtained a higher frequency and a greater percentage of student responses stored in submatrix D than did those Ss who were assigned to Treatment B ($p < .05$).

It was predicted that each S assigned to teach the value clarification phase of a lesson (Treatment B) would obtain more behavior in submatrix F than would the S assigned to teach the first phase of the same lesson (Treatment A). If students respond (or react) immediately after the teacher has spoken using preferential, consequential, criterial, imperative, or emotive statements, the behavior is stored in submatrix F. For five of the six teaching teams, the S assigned to teach the value clarification phase of the lesson secured a higher percentage of student repsonses stored in submatrix F than did the S assigned to teach the concept instructional phase of the lesson. For all Ss, those assigned to Treatment B obtained a higher frequency and a greater percentage of student responses stored in submatrix F than did Ss assigned to Treatment A ($p < .05$).

It was predicted that a S assigned to the value clarification phase of each lesson (Treatment B) would secure more extended preferential, consequential, criterial, imperative, and emotive statements from students than would the S assigned to Treatment B. When students speak for more than three seconds in one or a combination of these categories, the data is stored in submatrix I. In each instance, the S assigned to teach the value clarification phase of a lesson (Treatment B) secured more student statements stored in submatrix I than did the S assigned to teach the first phase of the lesson (Treatment A). Between-group differences for frequency and percentage are significant ($p < .05$).

It was predicted that Ss assigned to teach the value clarification phase of a lesson would secure more value-related statements than would Ss assigned to teach concepts and verbal information. All intervals of perferential, consequential, criterial, imperative and emotive statements are stored in Realm III of the SSOR matrix. The predicted difference between Ss for each team occurred. Between-group differences for frequency and percentage are significant ($p < .05$).

Related SSOR Measures

Other SSOR submatrices are related to predicted differences between treatment groups (Table 3). One would expect Ss assigned to Treatment A to react to student Subject-Centered statements more frequently than Ss assigned to Treatment B (submatrix B). In contrast one would expect Ss assigned to Treatment B to react to value-related statements more often than Ss assigned to Treatment A (submatrix H). For all Ss, these differences were found and were significant ($p < .05$).

One would also expect a value clarification lesson to result in a greater frequency of student transitions from the Subject-Centered to the Man-Centered Realm and from the Man-Centered to the Subject-Centered Realm (submatrices C and G). These differences were found to be significant ($p < .05$).

Ss assigned to teach the value clarification phase of lessons also obtained more student behaviors ($p < .05$) in four of the five Man-Centered categories -- preferential, consequential, criterial, and imperative statements (Table 4).

Related Findings

During the course of this investigation Ss began to employ probing moves. Since this skill was not deliberately taught, it appeared that probing was related to the acquisition of one or more of the other moves acquired by the Ss.

In order to explore this possibility, a technical skill observation schedule was developed (Casteel and Gregory, 1975). The schedule contains five functional moves and one dysfunctional move (structuring, conditional, wait-time, indicative, and probing). Each move incorporates a number of discrete teacher behaviors. Two coders were trained to the criterion of 85% between observer agreement. These coders then coded videotapes of the microteach.

A number of significant correlates ($p < .05$) between instructional moves were found (Table 5). Teachers who closed lessons or parts of lessons by summarizing what had occurred and indicated how what had been accomplished related to the next learning task or event also used probing behavior in order to refocus their lessons ($r = 0.64$). This represents a relationship between an element of structuring and an element of probing.

Teachers who waited silently after an initial student response, in order that the student or other students might continue, also used probing moves ($r = 0.83$). This represents a relationship between probing moves and an element of wait-time moves.

Teachers who integrated and used student ideas in order to develop the lesson also use probing questions in order to refocus the lesson ($r = 0.62$) and in order to get students to compare previous statements they had expressed ($r = 0.60$). This represents a relationship between elements of indicative moves and elements of probing moves although the relationship between all indicative moves and all probing moves is weak and negative ($r = -0.13$).

Among other significant correlates found were the following: between structuring moves and conditional moves (r = 0.69); between structuring and after question wait-time (r = 0.70); between reinforcement for which a basis is provided and conditional moves (r = 0.74); and between reinforcement for which a reason is provided and wait-time moves (r = 0.59).

CONCLUSIONS

Results of the analyses performed yield information germane to the two questions at the focus of this paper.

1. Given a group of preservice teachers who have acquired and practiced complex teaching skills through microsimulation. Do they continue to employ the skills when placed in a microteaching situation?

Those Ss who participated in this study employed the four moves they have practiced in a microsimulation setting in a microteaching situation. Eight variables were used to compare the first microsimulation with the microteach. Ss changed significantly from pretest to posttest on all variables in the direction hypothesized.

2. If these teachers continue to employ the skills acquired, do they use the skills functionally?

The Ss involved in this study continued to use the skills they had acquired in order to guide divergent patterns of classroom discourse. It appears likely that Ss who can employ structuring, conditional, wait-time, and indicative moves in lecture-reaction, recitation, and value clarification modes could also use these skills in order to facilitate other patterns of classroom discourse. If this is true, it can be concluded that teachers may acquire, practice, and learn to use a cluster of technical teaching skills functionally through micro-simulations of teaching. Additional support for this conclusion was found in the correlates between instructional moves and elements of these moves.

DISCUSSION

All conclusions from research investigating the training of teachers must remain highly tentative. This is true due to the fact that an investigator works with a sample of convenience, no matter how he may apply randomization to this convenient sector of the universe. There are contextual variables over which the investigator has little control. This study shares these limitations.

This investigation was further limited by three other factors:

1. No pre-instructional data were collected. Prior to the first microsimulation, Ss had learned a feedback system and had learned to discriminate instances of instructional moves that may be used to manage a verbal environment. Ss had also viewed model tapes and, hence, may be presumed to have acquired skills through modeling. It should be noted, however, that this limitation would appear to work against the achievement of predicted pretest-posttest differences.

2. This study employed a pretest-posttest design in order to test the first hypothesis. The differences between pre- and posttest may have been due to variables other than the training program (e.g., methods course content, field experiences, etc.). On the other hand, Ss in this study changed significantly in predicted directions for eight variables within a period of five weeks. It appears unlikely

that the four complex behaviors taught were acquired as a result of incidental learning rather than as a result of deliberate training.

3. This study sought to ascertain whether teaching skills acquired by Ss through microsimulation; continued to be used functionally in a microteaching situation. It has been argued persuasively that a microteaching situation is a good substitution for the classroom (Allen and Ryan, 1969). Nevertheless, the microteaching condition used to assess the degree to which Ss trained through microsimulation could use the skills they learned functionally as teachers remains a substitute for the classroom condition. The added complexities of classroom teaching might extinguish, suppress, or even elicit behaviors learned during microsimulation.

Some basis for believing that the skills would continue to function is provided by the correlational data. Correlates regarding the utilization of structuring, conditional, wait-time, probing, and indicative moves reported from classroom research are remarkably similar to those found for the microteaching performance of Ss who participated in this study. This issue is, however, sufficiently important to demand further investigation.

Despite these limitations, it would appear that teachers may acquire and learn to use a complex set of teaching skills functionally. This, in turn, establishes a possibility of training a sample of teachers in order to validate relationships between various combinations of instructional moves and student process and product measures.

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Table 1

Summary of Means and Student t's for

Microsimulation 1 and Microteach 1 (N = 10)[a]

		7-7	9-SR	9-16	16-SR	7-9	9-7	COMB.	IND.
Pretest	$\bar{X}$	59.70	8.30	2.90	2.70	12.00	4.30	12.40	5.40
	s.d.	35.03	2.61	2.17	1.85	2.93	2.46	7.85	6.12
Posttest	$\bar{X}$	171.20	12.30	10.8	9.90	15.80	2.00	28.40	10.3
	s.d.	1[illegible]3.20	4.80	6.13	6.14	5.04	1.26	13.32	10.3
student	t	2.76*	2.47*	4.08*	3.86*	2.58*	2.23*	3.61*	2.90*

$*p < .05$

[a]Data for subjects who attempted but were unable to complete the first microsimulation are not included.

Table 2

Summary of Means and Student t's for

Predicted Treatment Group Differences (N = 12)[a]

		Sub-Matrix D		Sub-Matrix F		Sub-Matrix I		Realm III	
		freq.	%	freq.	%	freq.	%	freq.	%
Treatment A	$\bar{X}$	18.67	4.97	4.83	1.36	3.83	1.12	13.17	3.69
	s.d.	5.19	1.59	1.68	0.58	3.18	0.98	3.93	1.47
Treatment B	$\bar{X}$	8.50	2.38	13.00	3.14	42.83	10.32	76.67	19.13
	s.d.	3.20	1.45	8.33	2.12	26.38	6.61	35.09	8.91
student t		3.73*	2.69*	-2.15*	-1.80*	-3.23*	-3.24	-4.02*	-3.32*

* $p < .05$

[a]Student t's favoring Treatment B are designated by a negative sign.

Table 3

Summary of Means and Student t's for Submatrices

Related to Predicted Differences Between Treatment Groups (N = 12)[a]

		Sub-Matrix B		Sub-Matrix H		Sub-Matrix C		Sub-Matrix G	
		freq.	%	freq.	%	freq.	%	freq.	%
Treatment A	$\bar{X}$	22.17	5.95	5.83	1.61	3.17	0.91	2.50	0.74
	s.d.	4.67	1.64	2.11	0.72	1.86	0.61	0.96	0.37
Treatment B	$\bar{X}$	10.83	2.78	16.67	4.05	13.00	3.63	12.83	3.46
	s.d.	3.13	1.13	9.23	2.33	7.53	2.43	6.28	1.97
students t		4.51*	3.56*	-2.56*	-2.23*	-2.84*	-2.42*	-3.64*	-3.03*

* $p < .05$

[a]Student t's favoring Treatment B are designated by a negative sign.

Table 4

Summary of Means and Student t's for

Value-Related Categories of the SSOR (N = 12)[a]

		Preferential		Consequential		Criterial		Imperative		Emotive	
		freq.	%	freq.	%	freq.	%	freq.	%	freq.	%
Treatment A	$\bar{X}$	0.50	0.12	6.33	1.36	2.83	0.74	2.33	0.66	1.17	0.30
	s.d.	1.19	0.26	4.61	1.40	2.54	0.70	2.98	0.89	0.69	0.22
Treatment B	$\bar{X}$	6.50	1.59	25.67	6.54	22.00	5.79	20.17	4.69	2.33	0.52
	s.d.	5.62	1.65	9.94	3.16	11.11	3.16	17.21	3.69	2.29	0.47
student t		-2.34*	-1.97*	-3.94*	-3.02*	-3.76*	3.49*	-2.28	-2.37*	-1.09	-0.95

*$p < .05$

[a]Student t's favoring Treatment B are designated by a negative sign.

Table 5

Correlates for Selected Elements of Technical Teaching Skills*

S	S?	P-S	H-D	COND	CUE	LINKC	LINK?	WAIT	W-T I	W-T II	W-T III	IND	R+R	INTEG	R+C	PROB	REF	REL
1.00	0.70*	0.63*	0.74*	0.69*	0.74*	0.39	0.74*	0.32	0.70*	0.18	0.04	0.44	0.50*	0.56*	0.71*	0.31	0.27	0.24
	1.00	0.39	0.13	0.09	0.11	-0.08	0.18	-0.07	0.56*	0.15	-0.33	0.22	0.01	0.21	-0.46	0.39	0.15	-0.12
		1.00	0.57*	0.63*	0.62*	0.53*	0.51*	0.53*	0.49	0.62*	0.10	0.08	0.51*	0.54*	-0.28	0.56*	0.64*	0.53*
			1.00	0.81*	0.91*	0.48	0.82*	0.36	0.54*	0.22	0.13	0.25	0.69*	0.58*	-0.47	0.35	0.40	0.46
				1.00	0.94*	0.89*	0.80*	0.75*	0.47	0.30	0.60*	0.43	0.74*	.66*	-0.63*	0.21	0.35	0.34
					1.00	0.75*	0.76*	0.55*	0.37	0.21	0.41	0.47	0.70*	0.53*	-0.73*	0.21	0.34	0.32
						1.00	0.51*	0.84*	0.18	0.28	0.81*	0.45	0.69*	0.61*	-0.48	0.60	0.32	0.30
							1.00	0.61*	0.78*	0.29	0.31	0.14	0.57*	0.63*	-0.56*	0.20	0.24	0.35
								1.00	0.38	0.53*	0.83*	0.19	0.59*	0.63*	-0.43	0.25	0.31	0.37
									1.00	0.34	-0.09	-0.02	0.45	0.63*	-0.42	0.42	0.42	0.39
										1.00	0.15	-0.28	0.23	0.33	-0.24	0.23*	0.37	0.40
											1.00	0.38	0.45	0.43	-0.25	-0.22	0.05	0.12
												1.00	0.38	0.31	-0.42	-0.13	-0.08	-0.26
													1.00	0.86*	-0.35	0.30	0.32*	0.60*
														1.00	-0.27	0.37	0.53*	0.72*
															1.00	0.17	0.16	0.27
																1.00	0.53*	0.46
																	1.00	0.74*
																		1.00

S - Structuring moves
S? - Structural question
P-S - Pre-Set closure
H-D - Hypothetico-Deductive move
COND - Conditional moves
CUE - Cueing conditional
LINK C - Linking Conclusion (conditional)
LINK ? - Linking question (conditional)
WAIT - Wait-Time moves
W-T I - Wait-Time I
W-T II - Wait-Time II
W-T III - Wait-Time III
IND - Indicative moves
R+R - Reinforce + Reason
INTEG - Integrate
R+C - Reinforce + Criticize
PROB - Probing moves
REF - Refocus probe
REL - Relate probe

* Starred coefficients are significant or nearly significant: r = .50 ($p < .10$); r = .58 ($p < .05$); r = .71 ($p < .01$).

THE SSOR: SHORT DEFINITIONS

REALM	CATEGORY OF STATEMENT	DEFINITIONS
I SUBJECT-CENTERED	1. Topical	Student statements identifying the theme, the unit, the concept, the issue, or the problem that is the focus of group discussion.
	2. Empirical	Student statements providing verifiable data from memory, observation, reading, or oral presentation.
	3. Interpretative	Student statements assigning meaning to data or experience and expressed in the form of notions, opinions, comparisons, relationships, and connections.
	4. Defining	Student statements as to the meaning of a word or concept by reference to an accepted source, by context, by examples, by operant criteria, or by ideal type.
	5. Clarifying	Student statements rewording, rephrasing, or expanding on other statements by ways of explanations.
II * TEACHER-CENTERED	6. Infirming	Teacher or student statements of rejection, criticism, closure, or dissatisfaction expressed in the form of sarcastic, doctrinaire, or negative remarks.
	7. Commentary	Teacher or student statements reviewing or summarizing the directions of a group; or, teacher statements summarizing, structuring, providing new information, new directions, or responding to student requests for information.
	8. Dissonant	Teacher or student statements that what is being said is not understood, is causing confusion, or lacks either internal or external consistency.
	9. Interrogative	Teacher or student questions expressed during group interaction.
	10. Confirming	Teacher or student statements expressing acceptance, satisfaction, encouragement, or praise
III MAN-CENTERED	11. Preferential	Student statements assigning a value rating or classification to an idea, person, group, object, etc.
	12. Consequential	Student statements identifying the known or anticipated effects of an action, idea, object, feeling, etc.
	13. Criterial	Student statements identifying the basis for a decision, a judgment, an action, an interpretation, etc.; or, developing a table of specifications for use in decision-making.
	14. Imperative	Student statements of what should or should not be; of what ought or ought not to be done; or expressing a decision achieved by the group.
	15. Emotive	Student statements indicating personal feeling; or, efforts to express empathy with regard to the personal feelings of others.
IV NON-VERBAL	16. Silence	Period indicating quiet, absence of verbal interaction, reading, thinking, non-verbal activities, or work.
	17. Confusion	Verbal or non-verbal confusion making it difficult for members of the group to communicate.

* All teacher talk must be recorded in one of the control categories. Student statements may also be recorded in the control realm.

SOCIAL SCIENCE OBSERVATION RECORD (SSOR) MATRIX

	1. Topical	2. Empirical	3. Interpretive	4. Defining	5. Clarifying	6. Infirming	7. Commentary	8. Dissonant	9. Interrogative	10. Confirming	11. Preferential	12. Consequential	13. Criterial	14. Imperative	15. Emotive	16. Silence	17. Confusion	Total
1. Topical																		
2. Empirical																		
3. Interpretive																		
4. Defining																		
5. Clarifying																		
6. Infirming																		
7. Commentary																		
8. Dissonant																		
9. Interrogative																		
10. Confirming																		
11. Preferential																		
12. Consequential																		
13. Criterial																		
14. Imperative																		
15. Emotive																		
16. Silence																		
17. Confusion																		
Total (No.)																		
Total (%)																		

REALM TOTALS/% ____/____% ____/____% ____/____% ____/____%

Total Count ________ Cells Reached (289) ________ Categories Used (17) ______

Submat. Use (No.): A___ B___ C___ D___ E___ F___ G___ H___ I___ J___ K___ TOTAL______

Submat. Use (%): A___ B___ C___ D___ E___ F___ G___ H___ I___ J___ K___ TOTAL______

Submat. Use (Cells): A___ B___ C___ D___ E___ F___ G___ H___ I___ J___ K___ TOTAL______

Name of Observed____________________ Date___/___/7___ Place____________

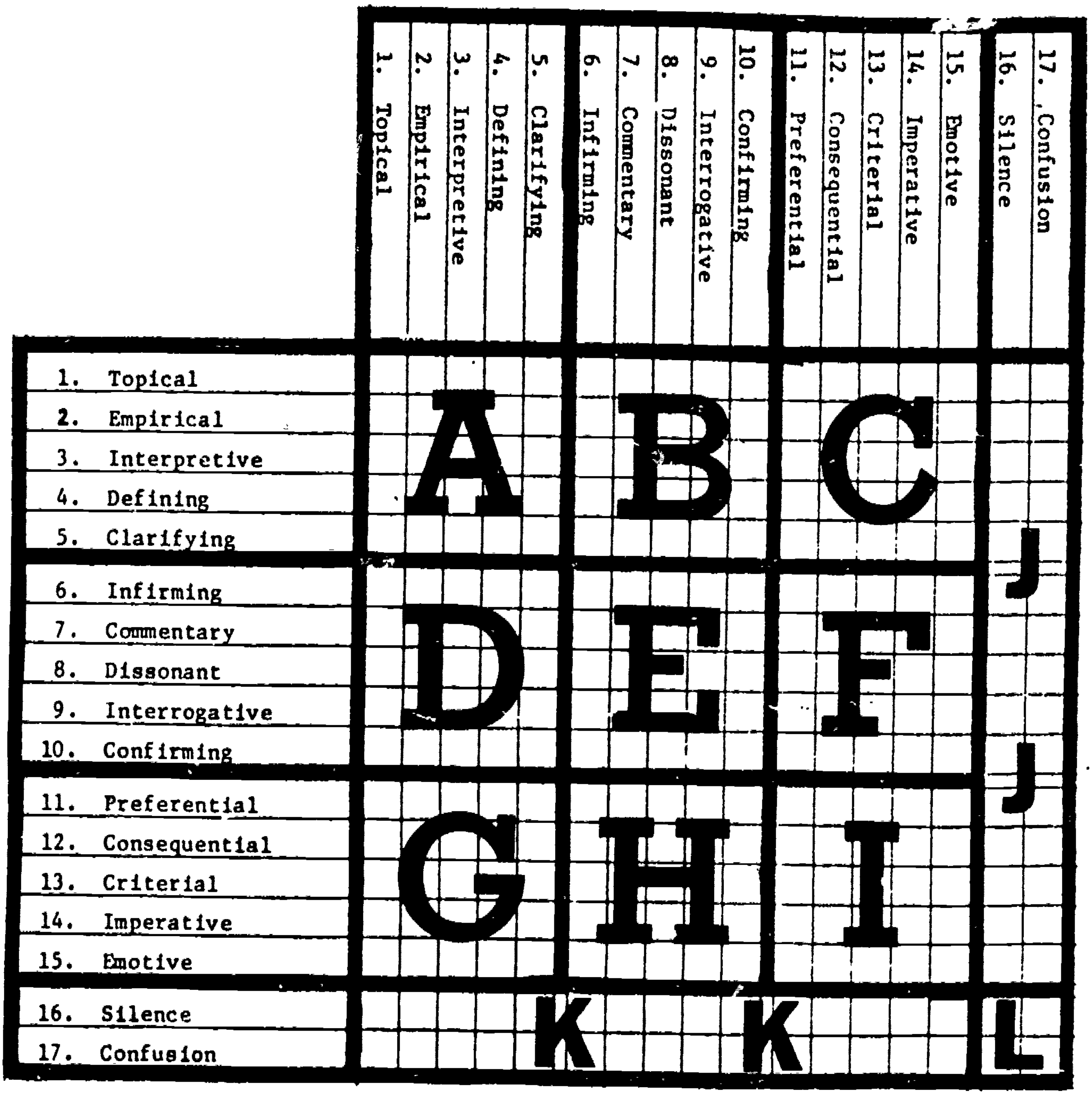
Observer______________ Conditions______________ Topic____________

Time Observed____min./____sec. Total Time____min./____sec. Sex: M F Age________

Mediation______________________ Other______________________

The Twelve Submatrices of the Social Science Observation Record

J. Doyle Casteel and Robert J. Stahl (c. 1973)
College of Education, University of Florida



DESCRIPTION OF SSOR SUBMATRICES*

SUBMATRIX	DESCRIPTION
A	twenty five (25) cells showing patterns of student Subject-Centered statements following student Subject-Centered statements.
B	twenty-five (25) cells showing patterns of teacher or student Teacher-Centered statements following student Subject-Centered statements.
C	twenty-five (25) cells showing patterns of student Man-Centered statements following student Subject-Centered statements.
D	twenty-five (25) cells showing patterns of student Subject-Centered statements following teacher or student Teacher-Centered statements.
E	twenty-five (25) cells showing patterns of teacher or student Teacher-Centered statements following teacher or student Teacher-Centered statements
F	twenty-five (25) cells showing patterns of student Man-Centered statements following teacher or student Teacher-Centered statements.
G	twenty-five (25) cells showing patterns of student Subject-Centered statements following student Man-Centered statements.
H	twenty-five (25) cells showing patterns of teacher or student Teacher-Centered statements following student Man-Centered statements.
I	twenty-five (25) cells showing patterns of student Man-Centered statements following student Man-Centered statements.
J	thirty (30) cells showing patterns of Non-Verbal behaviors following teacher and student verbal behaviors.
K	thirty (30) cells showing patterns of teacher or student verbal statements following Non-Verbal statements.
L	four (4) cells showing patterns of Non-Verbal behaviors following other Non-Verbal behaviors.

*Submatrices enable the teacher or researcher to collect and quantify different aspects of classroom verbal and non-verbal behavior patterns.

J. Doyle Casteel and Robert J Stahl, (c. 1973)

TECHNICAL SKILL OBSERVATION SCHEDULE (TSOS)*

Subject____________________ Date______________ Code #______

Moves	Behavior	Instances	T	Class Total
STRUCTURING MOVES	Lesson set			
	Internal set			
	Struct. question			
	Hypothetico-deductive			
	Preset closure			
CONDITIONAL MOVES	Cueing structure			
	Linking conclusion			
	Linking question			
	Linking-reinforcement			
	Linking-criticism			
	Student expressed			
WAIT-TIME MOVES	Wait-time 1			
	Wait-time 2			
	Wait-time 3			
	Wait-time 4			
	Wait-time 5			
PROBING MOVES	Minimal reinforcement			
	Mild criticism			
	Clarify			
	Justify			
	Puzzlement			
	Reflect			
	Refocus			
	Relate			
	Re-direct			
INDICATIVE MOVES	Reinforce + Reinforce			
	Repeat + Reinforce			
	Reinforce + Reason			
	Verbal marker			
	Review citation			
	Integration			
	Reinforcement + Crit.			
	Criticism + Reason			
	Minimal criticism			
DYSFUNCTIONAL MOVES	Post-question struct.			
	Multiple questions			
	Interruptive			
	Disruptive (int.)			
	Disruptive (ext.)			
	Extended criticism			
	Teacher init. ridicule			
	Student init. ridicule			
	Student expressed conf.			