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ABSTRACT

Much of the important thinking that teachers do occurs during the act of teaching as well as in planning and evaluating. What teachers think about while they are teaching was the basic question addressed in this study. A model was drawn to describe the researchers' concepts of the way a teacher thinks while teaching: the teacher begins with a teaching plan; the teacher receives feedback while teaching; and, on the basis of this feedback, either makes judgment to proceed as planned or to modify the plan. The decision-making processes of 12 experienced teachers were then studied in a laboratory setting. Each teacher was given the task of teaching a social studies lesson to eight junior high school students. Before teaching, each teacher was given 90 minutes to plan, thinking aloud into a cassette tape recorder. Segments of the actual teaching were videotaped in order to stimulate recall. These stimulated responses were also recorded. The model proved to be a useful way of conceptualizing what teachers think about while they are teaching. In addition, the results implied three generalizations: (1) teachers considered alternative plans only when the instructional process was going poorly, not because they were trying to optimize instruction; (2) pupil participation and involvement were the primary cues used by teachers to judge the process; and (3) teachers rarely changed their plan, even if the instruction was going poorly. (MM)

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TEACHER STIMULATED RECALL OF INTERACTIVE DECISIONS

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TEACHER STIMULATED RECALL OF INTERACTIVE DECISIONS

What do teachers think about while they are teaching? This was the basic question addressed in this study. This question implies two things about what we believe teaching to be. First, we think of teaching as an intellectual process. Teachers are intelligent people who think about what they are doing and use professional judgment in managing what goes on in their classrooms. Second, we believe that much of the important thinking that teachers do occurs during the act of teaching. This is not to downplay the importance of planning on the one hand or evaluation on the other, but rather to emphasize the importance of attending to teacher thinking during the interactive phase of teaching.

The model in Figure 1 represents the way we thought about teaching as we designed this study and analyzed the data. In our thinking, we built upon the ideas of other researchers. Following the approach to research on teaching suggested by Lee Shulman (Conference on Studies in Teaching, 1975), we conceived of teaching as clinical information processing. According to Shulman, "The phrase [clinical information processing] is meant to communicate two perspectives--a view of the task of teaching as fundamentally clinical in nature and a view of the human being who performs those tasks as an information processor." We have employed Philip Jackson's (1965) preactive-interactive distinction to describe the two major phases of teacher decision making.

With that brief overview, let us describe our model of the way a teacher thinks about teaching. In this model, the teacher begins with a teaching plan. The teaching plan is composed during the preactive phase of teaching--before the teacher is in actual contact with the students. The

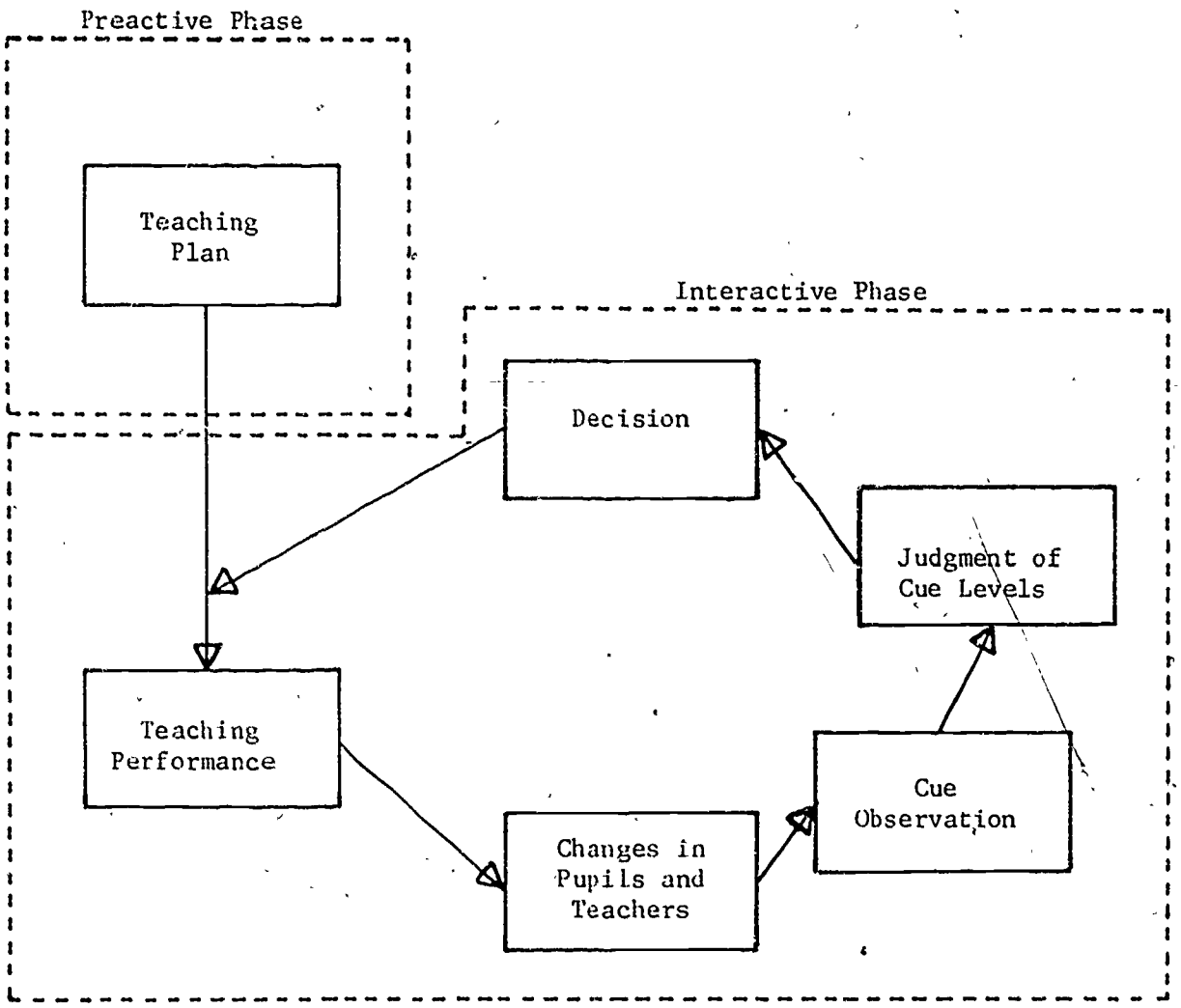

Figure 1. AN INFORMATION-PROCESSING MODEL OF TEACHING

teacher begins the interactive phase of teaching with some teaching performance or opening gambit that is part of the teaching plan. This initial move by the teacher produces some changes in both teacher and pupils. Some of these changes are observable by the teacher and some are not. A given teacher probably places more weight on some changes than on others. We call the most important observable changes "cues." The teacher observes these cues and makes judgments about whether these cues fall within the range of acceptable values for this teaching plan. If the cues do fall within the acceptable range, the teacher decides to continue the teaching plan and so the cycle is repeated as before. If some of the cues fall outside acceptable limits, the teacher may decide to continue with the teaching plan (hoping things will get better) or to modify the plan in a way that should restore the cues to acceptable limits.

Method

In order to gain information on the extent to which our model corresponded to the way teachers thought about teaching, we studied the decision making processes of twelve experienced teachers in a laboratory setting. Each teacher was given the task of teaching a social studies lesson to a group of eight junior high school students in three 50-minute teaching sessions. Before teaching, each teacher was given 90 minutes to plan the lesson. While the teacher planned, he or she was asked to "think aloud" into a cassette tape recorder. The protocol of the teachers "thinking aloud" represents the Teaching Plan in the Preactive Phase of our model. The data on teachers' preactive decision making has been reported in another paper (Marx and Peterson, 1975) and will not be described here.

We will concentrate on describing teachers' interactive decision making while they were in contact with students.

Teacher interactive decision making was explored using a Stimulated Recall procedure. This procedure consisted of showing each teacher videotaped segments of the day's teaching in order to "stimulate recall" of what he or she was thinking about while teaching. After viewing a videotaped segment, the teacher responded to a structured interview. The questions in the interview correspond to the boxes in our model of interactive decision making:

1. With regard to teaching performance, the first box in the model, the teacher was asked:
   What were you doing in this segment and why?
2. Changes in pupils and teachers, the second box in the model, were reflected in the videotaped segment viewed by the teacher. To get at possible internal changes taking place in the teacher, we asked the following question:
   Were you thinking of any alternative actions or strategies at that time?
3. To find out what changes in pupils were important to the teacher, we inquired:
   Did you have any particular objectives in mind in this segment? If so, what were they?
   Cue observation was then explored with the query:
   What were you noticing about the students?
4. Judgment of cue levels was elicited by the follow-up question:
   How were the students responding?
5. Finally, to ascertain whether the teacher made a conscious interactive decision, we asked:
   Did any student reactions cause you to act differently than you had planned?

Results

Now let us describe how teachers responded to these questions.

Teaching Performance

The first question in the stimulated recall interview was "What were you doing in this segment and why?" The purpose of this question was to help the teachers recall what they were doing and thinking about as they taught the part of the lesson that they had just viewed on videotape. Teachers were able to describe in general terms what they were doing in each segment and to put it into context but seemed to be less able to articulate why. In most cases, the implicit reason for their behavior was either that they had planned to behave in this way, or that they were simply going with the flow of events--doing what came naturally.

Changes in Pupils and Teachers

The second question probed internal changes that might have been going on in the teacher: "Were you thinking of any alternative actions or strategies at that time?" This question was asked a total of 43 times to the 12 teachers in our sample. The teachers responded affirmatively only eight times to this question. Three of the 12 teachers gave a single affirmative response, one teacher gave two affirmative responses and a fifth teacher gave three affirmative responses. These data indicate that it is relatively rare for teachers to be thinking about alternative actions or strategies while they are teaching.

The question about alternative actions or strategies was put to each teacher with reference to the beginning, middle and end of their lessons. No teachers indicated that they were considering alternative actions or strategies at the beginning of their lesson. That is, all of the teachers

in this sample seemed to have planned a single opening strategy and implemented it without considering alternatives. Similarly, only one affirmative response was received concerning the final part of the teachers' lessons. In the later stages of a lesson teachers did not seem to be considering alternatives because they felt that there would be insufficient time to make a meaningful change, even if they felt that a change was in order. Thus, seven of the eight occasions on which teachers reported having alternative actions or strategies in mind occurred during the middle period of the lessons.

When teachers were considering alternatives, it seemed to be because things were going poorly. For example, one teacher reported that at one point in the lesson he felt that he ought to be doing something different because the students were unenthusiastic, uninterested in the material, and not giving many verbal responses. Later in the session the same teacher reported that he was not thinking of alternative actions or strategies because "I was pleased with what was happening here. Not like before when I was sort of struggling with what was going on." What this finding seems to indicate is that the interactive decision making of the teachers in this sample was not aimed at optimizing instruction. That is, they were not particularly concerned with improving an adequate situation. Rather, their decision making came into play only when they felt the need to salvage an unacceptable situation.

Cue Observation

Part of the responses given to the question on alternatives pertain to cue observation, the third box in the model. The main cue that teachers in this sample used to judge whether alternative actions or strategies could

be considered was student participation and involvement. The experimental situation was essentially a small-group discussion setting. The teachers seemed to feel that if the majority of the students were participating in a discussion, regardless of the quality of that discussion, things were going well. Conversely, if the students were behaving unresponsively, things were going poorly and an alternative strategy might be attempted.

The cues observed by a teacher should be related to what changes in pupils are considered important by the teachers. Thus, the relative weight given to different pupil changes should be reflected by the teacher's response to the question, "Did you have any particular objectives in mind during this segment, and, if so, what were they?"

The objectives mentioned can be grouped into three categories: organizational, affective, and cognitive.

Organizational objectives are objectives that have to do with establishing rules, setting ground rules for behavior, informing students of the teacher's intended plan, and carrying out of the plan. The most frequently mentioned organizational objective was to carry out the teaching plan. This objective was cited 14 of the 19 times that organizational objectives were recalled. In a sense, this response barely qualifies as an objective since it does not refer to desired changes in students' behavior. The teachers seemed to be saying "My objective was to do what I was doing." This response should perhaps be treated as indicating that the teacher, in fact, had no particular objective in mind at that time. (Incidentally, no teacher ever said directly that he or she had no objective in mind during any of the teaching segments viewed.)

Among the affective objectives, teachers most frequently recalled their intention to create a group feeling such as rapport, relaxation, familiarity, or unity. This objective was mentioned 11 times of the total of 18 mentions of affective objectives. This objective was frequently mentioned in response to viewing the opening segment of the first teaching session, in which teachers and students were introducing themselves to one another. A second affective objective was to make students feel good about themselves. This was mentioned four times by three different teachers. A final objective mentioned in this category was to diagnose the students' affective states, i.e., to find out how they felt about the subject matter or the teaching process. This objective was mentioned three times.

Cognitive objectives were mentioned more frequently than organizational or affective objectives. In this category, the teachers reported the objective of encouraging their students to engage in cognitive processes such as recall, analysis, comparison, synthesis, and evaluation, with recall and analysis being mentioned most often. Other cognitive objectives mentioned were to diagnose the students' cognitive abilities, to help students understand the terminology, and to evaluate student learning.

A general observation about the responses to the question about objectives is that the teachers did not ever mention individual students. Objectives were apparently thought of as goals for the entire class as a group. Furthermore, the statements of student cognitive and affective objectives were global and general rather than specific and behavioral. This finding is consistent with previous research (Popham and Baker, 1970) that indicates that without specific training teachers rarely establish behavioral objectives that are tied closely to either instructional activities or evaluation devices.

Having described what changes teachers considered important, let us now see what cues teachers were noticing about students. For this sample of teachers, the cues mentioned in relation to students can be grouped into four categories: global student states, student behavior in relation to teaching process, student intellectual characteristics, and specific observable student behavior.

The largest number of cues noticed about students were in the global student states category. These cues were relatively high-inference observations of the mood or state of the class as a group. The terms used to describe the students in this category were tense, relaxed, quiet, shy, cooperative, interested, tired, attentive, and positive. Cues in this category were often used as explanations of why the teacher-student interaction was proceeding as it was. For example, in discussing a teaching segment late in the day, one teacher said "I guess I was noticing the tiredness of the group and their wanting to have side conversations instead of going on at that point."

In the category of student behavior in relation to teaching process, the cue that was mentioned by 11 of the 12 teachers was student participation and involvement. This cue was by far the most frequently mentioned of all cues, being mentioned three times as often as the next most frequent cue in any category.

The next category of cues noticed by teachers had to do with the intellectual characteristics and performance of the students. Only four of the 12 teachers mentioned cues in this category. An example of this category was a statement by one teacher that her students had "excellent factual recall." Another teacher noticed that his students did not have "any skill in asking

analytical questions." It was somewhat surprising to us that there were so few instances of cues in this category mentioned by the teachers. It seemed that much more attention and energy was focused on the mood of the group and the smoothness of the group process than on the learning being done.

The final category of cues noticed by teachers were specific overt student behaviors. This category had the smallest number of cues mentioned by the teachers. The cues included smiles, posture, and silly behavior. Smiles and posture were mentioned by one teacher and silly behavior was mentioned by only one other teacher. Thus, it was rare for teachers to mention low inference student behavior.

In describing what they were noticing, teachers sometimes spoke about individual students and sometimes spoke about the students as a group. Six of the 12 teachers spoke predominantly about students as a group, that is, they seemed to be using the class as their unit of analysis. Three of the teachers spoke primarily of individuals within the group when recalling what they had noticed about the students. The remaining three teachers gave approximately equal treatment to group characteristics and individual cues.

Judgment of Cue Levels

After cue observation, the next box in our model is judgment of cue levels. The question, "How were the students responding?" was expected to elicit some judgment on the part of the teacher as to whether the observed cues fell in the range of acceptable values defined by the teacher's teaching plan. The vast majority of teacher responses to this question indicated that the students were responding well, or as favorably as could be expected under

the circumstances. In those instances in which the teachers were dissatisfied with how the students were responding it was largely because of insufficient student participation or involvement. The quantity of student participation seemed to be the dimension on which judgment was passed. Quality of student participation was mentioned by only one teacher who reported that his students were not able to ask analytic questions.

Decision

Finally, we come to the last box in the model which represents the decision made by the teacher in response to his or her judgment of cue levels.

In response to the final question about whether the teachers had changed their behavior based on student reactions, 22 of the 31 responses were negative. Teachers did not tend to change their plans or behavior in response to student reactions. In five of the nine cases in which the teachers did report changing their behavior in response to student reactions it was unclear what the nature of the change was. That is, the teachers gave the impression that they had been influenced in some way by student reactions but they were unable to articulate the specific results of that influence. In the four remaining instances, the nature of teacher behavior change in response to student cues seemed to be either to continue with and elaborate upon an activity in progress (in response to favorable student reactions) or to digress or shift to a new activity (in response to generally unfavorable student reactions).

Conclusions and Implications

In conclusion, our information-processing model of teaching is a useful way of conceptualizing what teachers think while they are teaching. When we

applied our model to teachers' stimulated recall of interactive decisions, we found the following three generalizations which might have implications for teacher training:

> First, teachers considered alternative strategies only when the instructional process was "going poorly." That is, the teachers were not trying to optimize instruction.
>
> Second, pupil participation and involvement were the primary cues used by teachers to judge how well the instructional process was going.
>
> Third, the teachers rarely changed their strategy from what they had planned even if instruction was going poorly.

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