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ABSTRACT

This paper compares three analyses of stimulated-recall data gathered in interviews with 24 elementary school teachers who were reporting their interactive decision making (IDM). Two analyses were quantitative--one an experimental design, the other a content analysis--and one was qualitative. The experimental study found that teachers' reflection on their own IDM can generate signficant modifications in their IDM. The qualitative study, using a grounded theory design, generated three hypotheses about the relationship of IDM, time, and learning activities. The content analysis pointed to similarities and differences in teachers' concerns at decision points and identified concerns that were more and less important. A comparison of the three studies underscores the value of inquiry aimed at the generation of theory as a complement to inquiry that seeks to verify theory and emphasizes the important role stimulated-recall procedures are playing in building understandings of teachers as autonomous curriculum agents whose interactive cognition mediates teacher behavior and student learning. A discussion of some conceptual shortcomings of research on teachers' interactive cognition concludes the paper. (Author/JD)

Three Analyses of Stimulated-Recall Data

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THREE ANALYSES OF STIMULATED-RECALL DATA

This paper compares three analyses of stimulated-recall data gathered in interviews with a random sample of elementary school teachers who were reporting their interactive decision making. Two analyses were quantitative -- one an experimental design, the other a content analysis -- and one was qualitative. The experimental study found that teachers' reflection on their own interactive decision making (IDM) can generate significant modifications in their IDM. The qualitative study, using a grounded theory design, generated three hypotheses about the relationship of IDM, time, and learning activities. The content analysis pointed to similarities and differences in teachers' concerns at decision points and identified concerns that were more and less important. A comparison of the three studies underscores the value of inquiry aimed at the generation of theory as a complement to inquiry that seeks to verify theory and emphasizes the important role stimulated-recall procedures are playing in building understandings of teachers as autonomous curriculum agents whose interactive cognition mediates teacher behavior and student learning. A discussion of some conceptual shortcomings of research on teachers' interactive cognition will conclude the paper.

PERSPECTIVE

The assessment of teaching as a cognitive activity has enjoyed considerable attention since the late 1970s. Research on teacher effectiveness in prior years was dominated by a behavioral view that attended to what teachers do to the near exclusion of the cognition in which the behavior was grounded. Presaging the cognitive mediational orientation, Joyce and Hartoonian in 1964 portrayed the behavioral

preoccupation as obscurant and urged research programs aimed not at "an assessment of the way the teacher interacts with children at any moment," but at "the intellectual processes which resulted in that interaction" (p. 420). Earlier still, the authors of an HEW report attempting to identify criteria for "the good elementary teacher" emphasized that

> the term "good elementary teacher" involves both the notion that the teacher can define and resolve the problems which confront him upon a given occasion and that he improves in problem solving during his tenure in the classroom. (Turner & Fattu, 1960, p. 2)

The watershed in this line of inquiry was the publication in Curriculum Inquiry of Clark and Yinger's review of studies on teachers' planning, judgment, and IDM (1977). Later included in Peterson and Walberg's collection (1979), Clark and Yinger's work remains the most influential on teachers' thinking.[1]

Yet, inquiry on teachers' thinking ought to be framed by more than assertions, however cogent, that the behavioral view is conceptually truncated. It ought to be grounded in theory. A lesser-known work by Zvi Lamm (1976) explicated a theoretical framework for inquiry on teachers' thinking which, while incomplete, countered the atheoretical bent of many studies in this area. Lamm's premise was that an adequate theory of instruction must transcend mere advocacy of particular teaching/learning models. He reasoned that the choice of model "is the concern not of theory but of those who stand in need of it" (p. 49). A theory of instruction must be able to contain, simultaneously, contradictory models (or "logics," as Lamm

calls them) of instruction and, so, must necessarily be dialectic. Teacher decision making mediates the inherent and continual conflict among alternative patterns of instruction or courses of action. The teacher, then, is above all a decision maker. Faced with diverse, often polar, prescriptions for action in always unique instructional settings with constantly changing learners, teachers must decide what to do to support learning. Lamm is explicit on this point.

> The fact ignored by most studies of instruction is that the professional component of teaching lies in the stage at which the teacher decides what he ought to do. What the teacher actually does is no different from what other people do in occupations based on interpersonal relations. He speaks..., evaluates..., advises his pupils. Any of these actions could be performed equally well by grocers, artisans, army officers, housewives, social workers, or doctors. The teacher's behaviors are not specific to his profession. What <u>is</u> specific to the profession of teaching is the nature of the considerations that lead to the teacher's actions...and such considerations constitute the sole professional component in instruction. (1976, p. 66)

Inquiry into teachers' IDM is, then, relatively new, and its theoretical and methodological bases are yet incipient. Because this line of inquiry conceives teachers not as behavioral automata but as relatively autonomous cognitive beings whose cognitive-symbolic processes mediate interaction with given situations, research techniques that rely on quantification of observed classroom behavior had to give way to techniques that attempted to capture or trace aggregations of cognitions.[2] Predominant

among techniques used to tap interactive cognition has been the stimulated-recall interview (Bloom, 1953, 1954; Tuckwell, 1979; Morine-Dershimrer, 1984). This interview attempts to overcome the questionable validity and reliability associated with self-report data (Nisbett & Wilson, 1977) by using a tape recording of a lesson to stimulate during the interview a reasonably accurate recollection of interactive cognition. In some studies using this technique, lessons have been recorded on audiotape; video was used in others. In some, all of the recorded lesson was played back during the interview; in others, only a segment was used. In some, teachers stopped the playback whenever they remembered making a decision and then described that decision point to the interviewer; in others, the interviewer also stopped the tape when he or she believed a decision had been made.

Chief among the findings derived from stimulated-recall data of teachers' IDM are the following:

(1) Decisions made during preactive planning influence those made later during interactive teaching. Teachers tend to enter instruction with mental "images" (Morine-Dershimer, 1978-79) or "agenda" (Leinhart, 1983) that predetermine what will be considered a successful lesson.

(2) An image is usually played out until it, or the class session, ends; consequently, teachers tend to report making interactive decisions only when they perceive the lesson is going poorly -- that is, when the image is not being realized (Peterson & Clark, 1978).

(3) The cues teachers use to judge the current success or failure of a lesson are student participation and involvement in the lesson (McNair, 1978-79; Peterson & Clark, 1978).

(4) Teaching tends to be the execution of a plan, and interactive decisions are, consequently, related to "fine-tuning" that plan in the face of a dynamic task environment (McNair, 1978-79).

(5) When teachers make interactive decisions, they rarely consider or weigh alternative courses of action (MacKay & Marland, 1978; Morine & Vallance, 1975). Reasons may be given for pursuing a particular course of action, but alternatives are rarely compared or contrasted.

While a considerable body of research on teachers' IDM has accumulated since the late seventies, key questions persist. How does a teacher's IDM change and develop? Especially, how does IDM change when brought under the light of conscious awareness and subjected to reflective inquiry? What might be learned about IDM if stimulated-recall data were analyzed without reference to predetermined categories, that is, what might be gleaned if data were studied without premature foreclosure of the inquiry? And, what is the content of teachers' thinking during IDM? Especially, what are they concerned about at decision points, and how do those concerns interact with the decisions they make? Are they concerned about pupil learning and attitude, about the scarcity of time, or about curriculum materials?

Three studies were conducted to consider these questions. All analyzed stimulated-recall data gathered in interviews with the same sample of elementary school teachers. The studies appropriated three research designs: Study 1 used an experimental, posttest-only control group design (Parker, 1984); Study 2 used grounded theory research (Parker & Gehrke, 1984); and Study 3, reported for the first time here, used a

content analysis. Each study will be described below. First, the three research designs will be described, then the three sets of results will be discussed, and finally the three analyses will be compared.

THREE RESEARCH DESIGNS

Data Source

A pool of 24 teachers was drawn randomly from the elementary teachers of a suburban Denver school district. The pool was randomly assigned to control and experimental groups. The resulting cells of 12 teachers each were considered large enough to permit the detection of significant differences in Study 1, but not so large as to render unfeasible the gathering of data. In studies 2 and 3, only the data gathered from the teachers in the control group were analyzed.

Experimental teachers were engaged in a nine-week treatment (described below) after which they and the control teachers were interviewed using the stimulated-recall technique. Experimental and control teachers brought to the interview an audio tape recording of a lesson conducted not more than 48 hours before the interview (after Bloom, 1953). Teachers were instructed to play back the recording and stop it whenever they remembered making a decision during the lesson (the interviewer never stopped the recording) and describe the recalled decision in as much detail as possible. A standard set of probe questions was used to elicit more thorough teacher reports. The interviews were recorded, and the resulting protocols were the data in the three analyses described below.

Study 1: Experimental. The twelve experimental teachers participated in a treatment lasting nine weeks and comprised of guided reflection and role-taking activities. Research on adult learning suggested the effectiveness of these experiences as interventions in adult cognitive development (Bents & Howey, 1981; Hunt, 1966; Sprinthall & Thies-Sprinthall, 1981).

Guided reflection is the attentive consideration of predetermined aspects of experience. It involves the turning of conscious thought back upon certain (hence, "guided") past experiences for description and deliberation. Simply put, guided reflection is introspection -- the pondering of "real experience." This treatment engaged the experimental teachers in activities in which they diagrammed and discussed interactive decisions they remembered making that day. When reflecting on a recalled decision, the teachers were asked to focus on the student behavioral cues that figured into those decisions, their perceived alternatives at a decision point, and the process of weighing those alternatives.

In the role-taking activities the experimental teachers assumed the role of "consulting teacher" (Sprinthall & Sprinthall, 1980). In this role, they conferred with other classroom teachers, who were not subjects, to elicit from them detailed descriptions of their IDM.

Four group sessions were held after school in the first, third, fifth, and seventh weeks of the treatment. Each lasted one and one-half hours. In the first two sessions, teachers were engaged in reflection activities; in the third and fourth, they were engaged in both reflection and role-taking

activities. Additionally, once each week during the treatment, the teachers completed homework reflection exercises focused on interactive decisions they had made that day.

There were four dependent variables in this study: the frequency of interactive decisions, of monitoring student behavior, of considering alternatives at decision points, and of weighing alternatives at decision points. Four one-way analyses of variance were conducted to compare the means of the experimental and control groups.

Study 2: Grounded Theory. The grounded theory approach (Glaser & Strauss, 1967) is an inductive system for generating interrelated hypotheses which are grounded in data. Before any categories or hypotheses are defined, data are collected, coded, analyzed and arranged by properties into theoretical categories (concepts). Further analysis of the evolving categories generates working hypotheses and provides direction for the next stage of data collection. Alternating stages of data collection and analysis follow, in which later data are collected and compared with the emerging categories and hypotheses. The theory is presented to others when this constant comparison has produced a condition nearing what Glaser and Strauss call "saturation," that is, when terminology has been established, modification of the categories and properties has decreased, and inter-relationships have been identified.

The data in this study were the protocols of teachers who were the controls in Study 1. Similarities and differences in ideational units in these protocols were identified, compared, and contrasted. Then, categories were identified and, from these, hypotheses generated. The first round of data analysis was followed by returns to the protocols to

compare and contrast ideational units, identify additional categories, refine and modify previous categories, and substantiate the emerging hypotheses. Three interrelated hypotheses about IDM and its relationship to learning activities, time, and decision rules and routines were generated and constitute the findings of Study 2.

Study 3: Content Analysis. The third study was a content analysis of the IDM of the same twelve teachers described in the grounded theory analysis. Content analysis is defined by Holsti as a "multipurpose research method developed specifically for investigating a broad spectrum of problems in which the content of communication serves as the basis of inference" (1969, p. 4). This method is well-suited to the analysis of verbal protocols generated during stimulated-recall interviews.

Fourteen category-sets from an earlier, broader analysis of teachers' thinking (McNair, 1978-79) were adapted to the present analysis of IDM. The fourteen category-sets are detailed below.

Pupil Learning. Those teacher concerns with a group's or an individual student's gaining of factual information, concepts or theories being presented in the lesson were plugged into the pupil learning category. Typically, the concerns would arise from a general tendency for the student to be a slow or fast learner or from a more immediate response to a particular lesson. One teacher commented, "I knew she had it so I decided not discuss it any further"; another remarked, "He has a lot of trouble with sounds; so, though he seemed to have the idea, I decided to drill him a little more."

Pupil Attitudes. Pupil attitudes included areas which touched on the more affective aspects of student response to what was going on. One

teacher said, "This little girl is very shy and sensitive. That is why I decided to call on other students after she gave me the answer, to make less of the fact that she didn't give the right answer. Several teachers said, "He wasn't paying attention so I decided to call on him."

Pupil Behavior. Pupil behavior referred to concerns that centered upon how a student acted in the classroom. Once more, these concerns could be founded on a student's reputation for behaving or misbehaving, or they could result from the immediate situation. For instance, one teacher noted, "He is likely to poke and bother the person next to him, so I decided to put him next to me." Or, as another teacher explained, "They were more excitable than usual today, so I tried not to let them get away with anything."

Content: Task. This category addressed those concerns that related to the learning activity in which the students were engaged and included such statements as "I at first wanted them to write their own stories, then changed my mind and had them write a group story."

Content: Facts and Ideas. This category included those times when a teacher focused on a concept the children were to obtain from the lesson. A typical example of this type of concern would be the statement, "That's a difficult idea for kids this age, so I decided to take a little longer with it."

Content: Objectives. This category referred to concerns with the mastery of the knowledge and skills developed in the lesson. The comment, "I hadn't thought about it, but one of the things I wanted them to be able to do was rely on themselves. So instead of spelling a word for them, I had them look it up themselves," is representative of this category.

Procedures: Directions. Directions included concerns that pertained to what the students were supposed to do to accomplish the task set forth in the lesson and may be as simple as: Read pages 100-110 in your reader, or as complex as an explanation of how to do a crossword puzzle. A teacher exhibiting this concern might say, "When I gave the directions, they weren't clear so I decided to do the first one as an example."

Procedure: Modifications. Modifications encompassed those concerns that pertained to specific deviations from the normal routine and/or procedures. Normal or usual is the key word here. A concern of this nature would be, "Usually, I have the children take turns and answer individually, but I decided to see what would happen if I let them answer as a group."

Procedure: Scheduling. Scheduling referred to those concerns that pertained to the order in which things happened during a lesson. A lesson may include more than one activity, e.g., individual seat work followed by a group reading session; or an activity may have several parts, e.g., a vocabulary review, a question and answer review of the study and board work. A concern, during the lesson, with the order in which these occurred would fall into this category. For example, one teacher commented, "Instead of discussing the story and then doing a vocabulary lesson on the board, today I decided to do it the other way around."

Instructional Systems. Comments which related to the various approaches to instruction that involved standard textbooks, workbooks, charts, flash cards and other teaching materials and to those materials which were packaged and marketed on a wide scale were included in this

category. For instance, such a concern as one expressed by one teacher, "It's important that we work on the correct chart so I decided to go to my desk and check it." is a typical of the decisions placed in this category.

Teacher-Developed Aids. This category included remarks that focused on materials the teacher had made, purchased, and/or altered to enhance a lesson -- things such as a vocabulary game created by the teacher, special flash cards tailored to each individual student's needs, special dittoed worksheets, etc. As an example, one teacher remarked, "I hoped that the children would like the game but I decided it was too distracting so I put it away."

Time-Block Restrictions. Concerns which focused on accomplishing a certain amount by the end of the period in which the lesson was taking place were set in the time-block restriction sub-category. For instance, "I wanted to finish the story by the end of the lesson so I asked fewer questions between sections."

Pacing. Those concerns which related to the pace of the lesson, that is, to the speed at which material was being presented, or related to the flow of teacher questions and student responses, to the amount of wait time allowed, to the amount of time students were disengaged -- all these were placed in the pacing category. An example of this type of concern was the comment, "I gave them the answer myself because I felt things were moving too slowly. I was losing their attention."

Time-Related Goals. Time-related goals referred to those concerns of the teachers having to do with long-range expectations for the amount of material presented, the number of assignments completed, the number of pages done in a workbook, etc. A comment which typified this

type of concern was, "I skipped enrichment work today and we worked in their workbook so it'd be done by winter vacation."

Prior to classifying teaches' reports into these categories, the verbal reports had to be "unitized" (Guetzkowk 1950). That is, raw data were transferred into meaningful units of analysis, or "ideational units" (Bloom, 1954), which could in turn be classified. Effective unitization required that "false starts" and "mazes" (Tuckwell, 1980) be stricken from the transcripts and that remaining protocols be reduced to single ideas, activities, or thoughts.

Ideational units identified in the present analysis differed from those in the experimental study, underscoring King's claim that the category determines the unit: "The unit is only established when a segment of the transcript matches with the characteristics of a category" (1979, p. 385). Usually, a decision point contained only one ideational unit relevant to any of the fourteen categories. These excerpts are typical:

Teacher #8: (Stopped tape and reported) Carol is a little girl who is kind of bashful so she wanted to say something, but yet she could never get it out. So, I just went ahead and called on another person after a little time.

Interviewer: (Asking a standard "What else?" probe) What else do you remember thinking about when you made that decision?

Teacher #8: Not too wait to long and embarrass her.

Note that the material before the probe is difficult to code because it is not a complete ideational unit vis a vis one of the category-sets. Not until after the probe does this segment of the transcript match a category: pupil attitudes. Here is another example.

Teacher #1: (Stopped tape and reported) I decided (to talk about) tribes because I want to get them to see that modern people don't live in tribes and that these are primitive people, and I was trying to make a point.

Interviewer: (Standard clarification probe) Make a point about what?

Teacher #1: I had better explain that again. I am trying to make a point that people who live in tribes are still fairly primitive in the way they live. There is nothing modern about them. OK? And that is the reason I started off with tribes and I was trying to work my way into primitive, and I think that was about the time that we stopped taping.

What becomes clearer after the probe is that this teacher was focusing on a concept she wanted students to learn (the "facts and ideas" category) rather than focusing on pupil learning per se. King's (1979) notion, then, of the relationship between units and categories is a useful and accurate description of the unitizing process: Unitization was dependent upon prior categorization.

THREE SETS OF FINDINGS

Study 1: Experimental. A statistically significant difference between experimental and control teachers was found on each of the four dependent variables (Tables 1-4). Effect sizes were also calculated, and for each variable the effect size was well beyond the 80th percentile of the control group.[3] While guided reflection and role taking were expected to have significant effects, two informal observations may help explain the magnitude of their effect. First, in the discussions that followed each

reflection activity, the teachers usually directed their comments toward weighing the alternatives that appeared in their diagrams and discussing which students had "triggered" the decision. These teachers were becoming students of their own IDM. They quickly became aware of the myriad decisions they were making during instruction and were quite eager to share emerging patterns. They evaluated the effectiveness of alternative courses of action and became curious about models of decision making.

Second, the role-taking activities appeared to reinforce what the reflection had initiated: Role taking seemed to produce a leap in their development -- they became "advanced" students of their IDM. As they took the role of consulting teachers, they noticed and later shared newly discovered, more subtle features of their own and others' IDM. They became even more judgmental of different IDM patterns. In the discussions following the role-taking activities, the teachers were eager to share their judgments and considerations about the IDM of the teachers with whom they had just worked. Comments included, "I liked _____'s decision making because he always seemed to notice what his students were doing right then." And, "_____ seemed to have a one-track mind. He never played with alternatives."

The nature of these teachers' discussions at the group sessions thus lends some insight into the effectiveness of guided reflection and role taking. These adult development techniques are phenomenological and acknowledge the central role of ego in adult learning. As such, they do not seek to "train" teachers to make certain decisions to the exclusion of others, but help elucidate extant cognitive activity, making explicit the IDM that was previously implicit. It appears that, once explicit, the

cognitive activity is brought under scrutiny and develops. The experimental teachers reported more decisions, more frequently considered alternatives at a decision point, more frequently weighed them against one another, and more often considered student behavioral cues at decision points.

Study 2: Grounded Theory. The results of a grounded theory study are hypotheses and, linked together, substantive theory. Below are three hypotheses generated in the grounded theory analysis of the twelve protocols. Discussed and illustrated elsewhere (Parker & Gehrke, 1984) they can be only adumbrated here.

First, teachers' IDM is embedded in learning activities; that is, teachers' decisions are situated within and largely determined by the particular learning activity the teacher is attempting to conduct. IDM, then, is not external to learning activities, not a trait teachers carry into these situational structures; rather it is immersed in the activities, its character and content derived from the syntax of the particular activity at hand. Both academic and managerial decisions are thus embedded, as illustrated in the excerpt of a teacher reporting her decisions in an activity wherein students read, "round-robbin" style, from a science text:

(a) "I guess there was a decision to continue (with the) reading. I guess I'd said whatever I had to say to clarify what single-celled animals were, and then I wanted to go on to the next point."

(b) "____ has got a speech problem, and I made a decision to have her say the word over again."

(c) "Ok, I called on _____ yesterday. He was one of the kids who was able to say the big words ... so, when I called on him again, I figured he could say it.

The academic and managerial dimensions of conducting a text-based, round-robbin science lesson compelled this teacher to make decisions related to which student would read next, when passages should be repeated, and the enforcement of norms indigenous to such an activity (e.g., reading one at a time, clearly and with volume, and listening to one another read).

Second, moving learning activities forward to completion, that is, to the fulfillment of a teachers' image of an activity, is a primary teacher intention during interactive teaching. The category of IDM that matured with each return to the data is what was eventually called a "forward" -- a decision to move the learning activity along, in time, toward closure. Teacher 6, reporting what might be called a "fast forward," said

> I had just looked at the clock and thought, man, I had better get on with the filmstrip. It was a decision that I've just got to stop this conversation short and get on with the next thing.

Third, decision rules and routines support teacher intentions to move learning activities forward to completion. A decision is the selection of an alternative from two or more alternatives, and a decision rule can be considered a preselected response called up, as if automatically, for use in familiar situations -- a rule about what to do when something in particular happens in the classroom. They are if-then statements perhaps based on some previous considerations of alternatives, or put in place through a reward earlier used, or they may be part of what is considered "intuitive judgment."

The responses called up by the decision rules are often routines. The routines, like the decision rules themselves, are supposed to move the activity forward, according to the image, to closure. When a student provides a wrong answer, a teacher might engage a refocusing routine; another might engage a reprimand routine. As an activity ends, a teacher might conduct a formative check for understanding; another might give a verbal summary; another might simply say, "That's all for now." Virtually all routines are dedicated to moving an activity forward; however, some elicit the kind of thinking and responding that facilitate substantive understanding of the material while others seem concerned almost solely with "getting the work done" and, consequently, promote a more or less superficial understanding. In other words, some routines press for learning and completion of the activity; others press only for completion.

Study 3: Content Analysis. Table 5 presents a comparison of the thinking of the twelve teachers based on the frequency and percentage of concerns across the fourteen categories at self-selected decision points. Table 6 summarizes the data in table 5 and compares them to the findings of two other studies of teachers' thinking (McNair, 1978-79; Galluzzo, 1984). Looking first at the findings of the present study, it is clear that a concern for pupil learning arose most frequently (39% of the concerns mentioned belonged to this category), and the next most frequent concern, mentioned less than half as often as pupil learning, was content-related facts and ideas (17%). Third in the ranking was the concern for tasks (12% of the concerns mentioned belonged to this category). Four concerns were not mentioned by any teachers: instructional systems, teacher-developed

aids, pacing, and time-related goals. (It is interesting to compare the apparent lack of concern with pacing and time-related goals in this analysis with the prevalence of the "forward" detected in the grounded theory analysis, a point that will be developed in the comparison following this section.)

There are interesting differences between these findings and those of the McNair and Galluzzo studies (Table 6). Those studies had entries in four categories that were empty here, though the ranking of these categories was low in those studies. Galluzzo found far less concern with facts and ideas (3%) than was found in the other two studies where the facts and ideas concern was ranked second and third respectively. And, Galluzzo found far more concern with pupil attitudes (23% and tied for first in the category ranking with pupil learning). It is important to note that there were substantial methodological and data source variations across the three content analyses, which explains some of these differences. Most importantly, Galluzzo studied student teachers while in McNair's and the present study inservice teachers were studied. It is well known that students have a marked concern for pupil attitudes, and it is not surprising that their lack of experience at teaching the content before them (particularly since it was probably selected by their supervising teachers) would result in few statements about it during the interview (cf. Fuller, 1969; Fuller & Bown, 1975). Similarities between McNair's and the present study are noteworthy since they occur in spite of McNair's extensive interviewing over time (2 lessons x 3 times during the year x 10 teachers = 60 interviews in the McNair study compared to 1 lesson x 1 time during the year x 12 teachers = 12 interviews in the present study).

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Another approach to these data (after Morine-Dershimer, 1984) added another dimension on which the teachers' concerns at decision points could be compared and their patterns of emphasis noted. Figures 1 - 12 present profiles of each teachers' thinking based on the proportion of decision-points discussed in which a particular class of concern was mentioned (Table 7). This is useful information because it reveals graphically which concerns, if any, are dominating a teacher's IDM. To enhance the comparison, the proportional data for all teachers across the ten categories in which there were entries were used to compute a mean proportion (.121) and standard deviation (.18). Three descriptors characterize the presence of a particular concern in a teacher's thinking: a "pertinent" concern refers to a category with a proportion falling between the mean and one standard deviation above it (.301); "important" refers to categories with a proportion falling between one and two standard deviations from the mean (.481); and "dominant" was reserved for categories with a proportion above two standard deviations from the mean (.481 and above).

The profiles illustrate that seven teachers' IDM is dominated by one concern, and for six of the seven, that concern is pupil learning. Teacher #7's thinking at decision points is dominated by two concerns: pupil learning and task concerns. Of this teacher's six decision points, half contained these concerns. Teacher #3 is distinguished by having the fewest decision points during the lesson (three) and the fewest concerns (three). Pupil learning dominated this teacher's concerns (mentioned at two out of three decision points), and the task was "important" (mentioned at one of the three decision points). Teacher #10 is distinguished by the greatest breadth of concerns, and all were at least pertinent. Pupil learning and

and behavior were pertinent concerns (mentioned in 13% of the decision points); pupil attitudes, tasks, and directions were important concerns (each mentioned in 38% of the decision points); and scheduling was a dominant concern (mentioned in half of the decision points). Teacher 12 is distinguished by an ever-present concern for content facts and ideas.

DISCUSSION

Two methodological distinctions stand out in the three analyses. The first is between the experimental study and the other two -- a fundamental distinction between attempting to change what is and attempting to describe or interpret it. The second distinction, between the grounded theory study and the other two, is a distinction between organizing phenomena according to categories determined prior to gathering data and waiting for categories to evolve from the data themselves. Indeed, the essence of grounded theory methodology is its insistence on waiting for the data to arrive. Clifford Geertz was keenly ware of these distinctions when he said of his work on culture:

> The concept of culture I espouse...is essentially a semiotic one. Believing, with, Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning. (1973, p. 5)

The first distinction is of no small moment in research on teachers' cognition. If Brophy (1984) is right, we may not be ready to seek changes

in teachers' IDM because we may not yet know what changes would result in greater effectiveness and which might reduce it. And, Newell and Simon's (1972) notion of the "problem space" would seem to argue against increasing the complexity or quantity of teacher cognition. However, such caveats, aside from bordering on an assertion that ignorance is bliss, derive at least partially from a traditional conception of treatments as inherently imposing interventions that result necessarily in more to do and more to think about - a conception that misunderstands interventions in general and reflection in particular while underestimating teachers' ability to reflect on their cognition within problem spaces. There are different sorts of treatments, and the sort used in Study 1 is distinguished by its assumption that teachers are autonomous curriculum agents, not obedient technicians, who think about what they are doing. Its hypothesis was that the opportunity to reflect on practice would generate a consequence-- that reflexive thought is itself a "treatment," and an emancipating one at that. As Sartre said, "To understand is to change, to go beyond oneself" (1968, p. 18). Reflection is an intervention that can lay bare ossified patterns of thinking and action, unpacking heretofore unexamined assumptions, implicit theories, and decision rules and routines. Maxine Greene grasped this emancipatory quality of reflection:

> (I)t affirms the existential importance of cognition, or rationality, while providing a grounding in the lived world. The lived world must be seen as the structuring context for sense-making of any sort, even for scientific inquiry...(R)eflection is not only rooted in experience, its entire purpose is to inform and clarify experience. (1978, p.17)

The second distinction, between discovering categories from data and bringing predetermined categories to the data, is not only an epistemological matter, it is phenomenological as well. Research has, as Ross Mooney put it, "an inner and outer drama" (1975, p. 175). For the researcher, then, this is more than a matter of alternative methodologies "whose varied employment responds simply to 'what works'" (Smith, 1983). The distinction between discovery and verification was very much alive in my experiencing of the analyses-- in the questions I was asking, the plans I was making, in the activities undertaken and the pondering throughout the studies about what they meant (which is to say, about what sense I was making of them).

Studies 1 and 3 were relatively simple "inner dramas." Granted, they required a good deal of arranging, but once this legwork had been done, I could just sit back and count. In Study 1, a hypothesis was formulated, a treatment had to be conceptualized (this was the brunt of the work), and categories corresponding to the dependent variables had to be identified as a basis for the post-treatment quantification of the data. All of this was carried out, of course, before even greeting a teacher or examining a speck of datum. Once the data were gathered, I became a coder and a calculator. My experience was of quite a different order in the grounded theory study where the "legwork" preceded the "headwork". The work began after the data were gathered, not before. Hypotheses had to evolve from data; consequently, categories had to be generated from similarities and differences found in the elemental properties of the teachers' reports. I was engaged now in a hermaneutic process, a constant movement between data and emerging categories, between parts and whole. While the experimental researcher is call upon to be a "stage manager," (McGuire, 1973), grounded theory researchers attempting to "read" data

and generate interpretive understandings are expected to "use their heads" (after Cronbach, 1975).

A telling example of this second distinction is the constrasting findings regarding time constraints in Studies 2 and 3. The "forward" emerges from the grounded study as the pervasive intention during instruction, yet the three time categories in Study 3 contained only two of 109 concerns. The explanation probably lies in the inherent narrowness of unitization and classification. Conducted properly, the processes are blind to distractions and to the gray zones between the categories; however, reading this grayness is the forte of grounded theory's hermaneutic approach to data. In the grounded study, the constant comparison of data to emerging categories permitted the forward to arise while the content analysis and experimental study foreclosed on even the possibility of this discovery. Similarly, only the grounded study permitted the understanding that images guide teachers' IDM, and that these images, along with forwards, rules, and routines -- are embedded in learning activities.

Aside from distinctions, what about the validity of the data that were analyzed? How can one be certain that the findings of any of the three studies are founded on veridical reports of these teachers' decision making during instruction rather than on their conjecture during the stimulated-recall interview? The answer is simple: One cannot be sure, but one can be reasonably confident. The wholesale dismissal of verbal report data (cf. Nisbett & Wilson, 1977) on the charge of "introspection" is wreckless and quite presumptuous-- wreckless because such an accusation does not discriminate between more and less valid reports and presumptuous because it (a) declares out of bounds a whole universe of data generated by the

very people who have an unparalleled vantage point from which to observe their own experience, and (b) presumes that human activity can be better known by methods which strip it of its phenomenological, lived dimension. The real problem with verbal report data, it seems to me, is not that as respondents we tell more than we know, but in quite the opposite direction, that "we know more than we say" (Polanyi, 1966).

LIMITATIONS OF COGNITIVE-MEDIATIONAL RESEARCH

Research on teachers' cognition is not metaphysically neutral. It promotes certain aspects of human experience and conceptions of schooling at the expense of others. It promotes teachers' thinking, in general, and IDM, in particular, as central to pedagogic action; it conceives teaching as a fundamentally cognitive activity, assigning teacher behavior a subordinate and derivative status. While this cognitive mediational view differs in obvious ways from its more prevalent behaviorist counterpart, there are also differences among those who profess it. The cognitive mediational view espoused in the main by the pivotal researchers engaged in this line of inquiry (for example, Clark & Yinger, 1977: Joyce, 1978-79; MacKay & Marland, 1978; Peterson and Clark, 1978) bears little resemblance beyond the object of its attention to the cognitive mediational views of scholars whose inquiry is shaped less by an individualistic frame of reference than a relational, structural one. The former body of research, from which the present studies were derived, asks a fairly broad range of questions within a very narrow conception of the complex relationship of teachers to one another and to the wider social organization in which schooling itself arises and to which it is subservient (Apple, 1982;

Bourdieu & Passeron, 1977). It fails to ask broader questions about the lifeworld (Seamon, 1979)--the taken-for-granted regularities and contexts for everyday living. It fails to deal critically with the tension between human agency and social structure and seems quite unaware that individual thought and action are not actually individual, per se, but social, framed and largely determined by the interpretive and structural milieus in which they occur. As such, this research tends to be atheoretical, ahistorical, and as a consequence, idiosyncratic. It tends to reveal epiphenomenal activity rather than the "deep structure" (Bredo & Feinberg, 1979) shaping that activity. In brief, it suffers "social amnesia" (Jacoby, 1975).

Future research on teachers' cognition needs to attend to the larger questions or, at the very least, avoid naivete' about them. Studies are needed which consciously situate teachers' decision making in the social settings where it occurs and explore it in its many aspects as a relational phenomenon joined with the life histories of the people who do it, with the school culture in which it fits, and with the socioeconomic structure it supports and, sometimes, transcends.[6] Specific questions for inquiry are:

1. How is teachers' IDM related to the reproduction of prevailing worldviews and ideologies as well as prevailing gender, class, ethnic and other arrangements?

2. In what ways, if any, does teachers' IDM seem to counter that reproduction?

3. How might teachers' thinking be influenced by microrelational factors (such as the social arrangements and power hierarchy within the school) and macrorelational factors (such as the shift from an industrial to a post-industrial economic base)?

4. Which modes of interactive cognition are prevented and which are supported by the assumed structures of interpretation and explanation in which teachers do their work? That is, how does "common sense" affect IDM?

That these questions are asked rarely is itself a relational phenomenon relfecting an undergirding bias toward idividualistic and technocratic questions rather than communitarian and philosophic questions (Dewey, 1927, Greene, 1978). Researchers would do well to liberate inquiry from the former so that our understanding of teachers' IDM might be informed by the contexts, large and small, in which it arises.

NOTES

1. Two other early influential works were a special issue of Educational Research Quarterly edited by Bruce Joyce (1978-79) and the review by Shavelson and Stern (1981).

2. See Shavelson and Stern's (1981) discussion.

3. Derived from the critical F, this was the most conservative effect size.

4. Newell and Simon (1972) propose that persons, when faced with complex and changing tasks, create a narrow "problem space" that simplifies the tasks by delimiting the stimuli and considerations permitted into awareness.

5. See the review by Ericsson and Simon (1980) and the discussion by Seltiz, Wrightsman, and Cook (1976).

6. A collection of studies that attempt to do this can be found in Apple & Weis (1983).

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Table 1: Number of Interactive Decisions

Analysis of Variance		F' = 4.3		alpha level = .05
Source of Variation	Sum of Squares	Degrees of Freedom	Variance Estimate	F
Between-groups	876.042	1	876.042	20.688
Within-groups	931.583	22	42.345	
Total	1807.625	23		

The experimental group made significantly more interactive decisions than did the control group.

Table 2: Monitoring of Student Behavior

Analysis of Variance		F' = 4.3		alpha level = .05
Source of Variation	Sum of Squares	Degrees of Freedom	Variance Estimate	F
Between-groups	2616.667	1	2616.667	82.553
Within-groups	697.333	22	31.697	
Total	3314.0	23		

The experimental group monitored student behavior significantly more than did the control group.

Table 3: Consideration of Alternatives

Analysis of Variance		F' = 4.3	alpha level = .05	
Source of Variation	Sum of Squares	Degrees of Freedom	Variance Estimate	F
Between-groups	693.375	1	693.375	12.813
Within-groups	1190.583	22	54.117	
Total	1883.958	23		

The experimental group considered significantly more alternatives than did the control group.

Table 4: Weighing of Alternatives

Analysis of Variance		F' = 4.3	alpha level = .05	
Source of Variation	Sum of Squares	Degrees of Freedom	Variance Estimate	F
Between-groups	2360.167	1	2360.167	9.275
Within-groups	5598.333	22	254.47	
Total	7958.5	23		

The experimental group weighed alternatives significantly more than did the control group.

TABLE 5 Frequency/Percentage of Concerns Mentioned Per Teacher

TEACHER	learning	attitudes	behavior	task	facts and ideas	objectives	directions	modifications	scheduling	instructional systems	teacher-developed aids	time block restrictions	pacing	time-related goals
1	7/.38	1/.06	0	0	6/.33	1/.06	0	3/.17	0	0	0	0	0	0
2	9/.53	0	4/.24	2/.12	1/.06	0	1/.06	0	0	0	0	0	0	0
3	2/.67	0	0	1/.33	0	0	0	0	0	0	0	0	0	0
4	2/.40	1/.20	0	0	0	2/.40	0	0	0	0	0	0	0	0
5	4/.67	1/.17	0	0	1/.17	0	0	0	0	0	0	0	0	0
6	6/.50	0	1/.08	-	3/.25	0	0	1/.08	0	0	0	1/.08	0	0
7	3/.38	0	1/.13	3/.38	1/.13	0	0	0	0	0	0	0	0	0
8	1/.20	1/.20	0	1/.20	2/.40	0	0	0	0	0	0	0	0	0
9	4/.57	0	0	2/.29	0	0	0	0	0	0	0	1/.14	0	0
10	1/.07	3/.20	1/.07	3/.20	0	0	3/.20	0	4/.27	0	0	0	0	0
11	2/.40	0	2/.40	1/.20	0	0	0	0	0	0	0	0	0	0
12	2/.25	1/.13	0	0	5/.63	0	0	0	0	0	0	0	0	0

TABLE 6

Frequency and Proportion of Concerns Mentioned--Summary of Table 5 and Comparison to Galluzzo (1984) and McNair (1978-79)

Category	Number of Concerns			Proportion		
	present study	Galluzzo	McNair	present study	Galluzzo	McNair
Pupil	60	50	489			
Learning	43	22	291	39%	23%	23%
Attitudes	8	22	128	7	23	10
Behavior	9	6	70	8	6	6
Content	35	24	395			
Task	13	18	188	12	20	15
Facts & Ideas	19	3	170	17	3	14
Objectives	3	3	37	3	3	3
Procedures	12	14	172			
Directions	4	5	87	4	5	7
Modifications	4	2	55	4	2	4
Scheduling	4	7	30	4	7	2
Materials	0	2	110			
Instructional systems	0	1	76	0	1	6
Teacher-developed aids	0	1	34	0	1	3
Time	2	4	83			
Time block restrictions	2	1	38	2	1	3
Pacing	0	2	28	0	2	2
Time-related goals	0	1	17	0	1	1
TOTAL	109	94	1249	approx. 100% (proportions rounded)		

TABLE 7 Number of Decision Points per Teacher and Proportion in which Category was Mentioned

TEACHER	DECISION POINTS	learning	attitudes	behavior	task	facts and ideas	objectives	directions	modifications	scheduling	instructional systems	teacher-developed aids	time block restrictions	pacing	time-related goals
1	16	.44	.06	0	0	.38	.06	0	.19	0	0	0	0	0	0
2	16	.56	0	.25	.13	.06	0	.06	0	0	0	0	0	0	0
3	3	.67	0	0	.33	0	0	0	0	0	0	0	0	0	0
4	5	.4	.2	0	0	0	.40	0	0	0	0	0	0	0	0
5	5	.80	.2	0	0	.2	0	0	0	0	0	0	0	0	0
6	11	.55	0	.09	0	.27	0	0	.09	0	0	0	.09	0	0
7	6	.5	0	.17	.5	.17	0	0	0	0	0	0	0	0	0
8	4	.25	.25	0	.25	.5	0	0	0	0	0	0	0	0	0
9	6	.67	0	0	.33	0	0	0	0	0	0	0	0	0	0
10	8	.13	.38	.13	.38	0	0	.38	0	.5	0	0	.17	0	0
11	5	.4	0	.4	.2	0	0	0	0	0	0	0	0	0	0
12	5	.4	.2	0	0	1	0	0	0	0	0	0	0	0	0

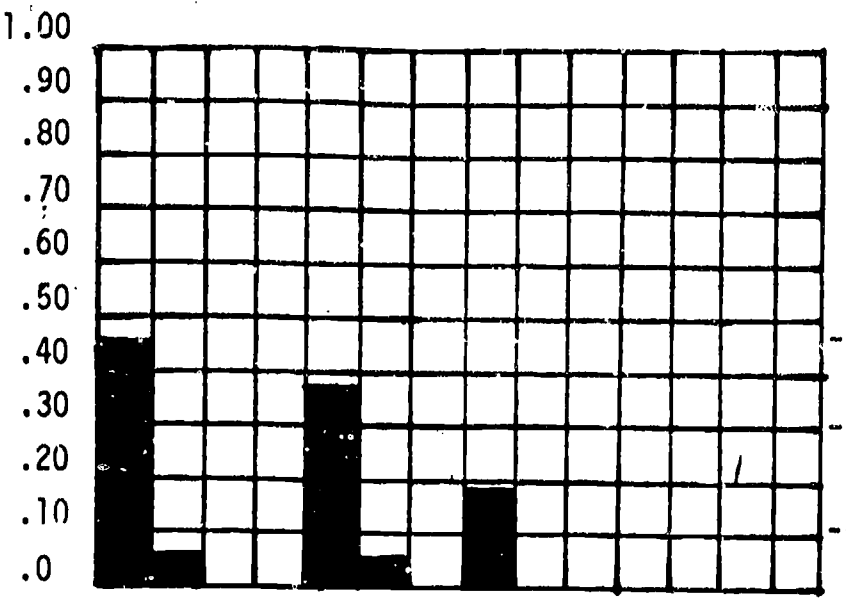
N=120 $E(X-\bar{X})^2 = 3.886$ $\bar{X} + 1SD = .301$

$\bar{X} = .121$ $SD = .18$ $\bar{X} + 2SD = .481$

FIGURES 1&2

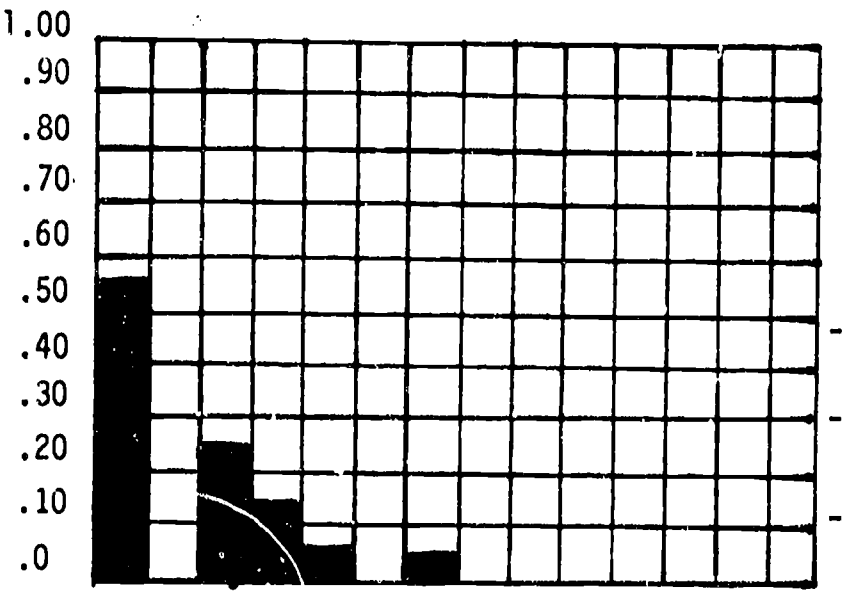
Teacher #1&2's Stimulated Recall Profile
(Proportion of decision points in which category was mentioned)

TEACHER # 1



(dominant) ---------- (.481)
(important) ---------- (.301)
(pertinent) ---------- (.121)

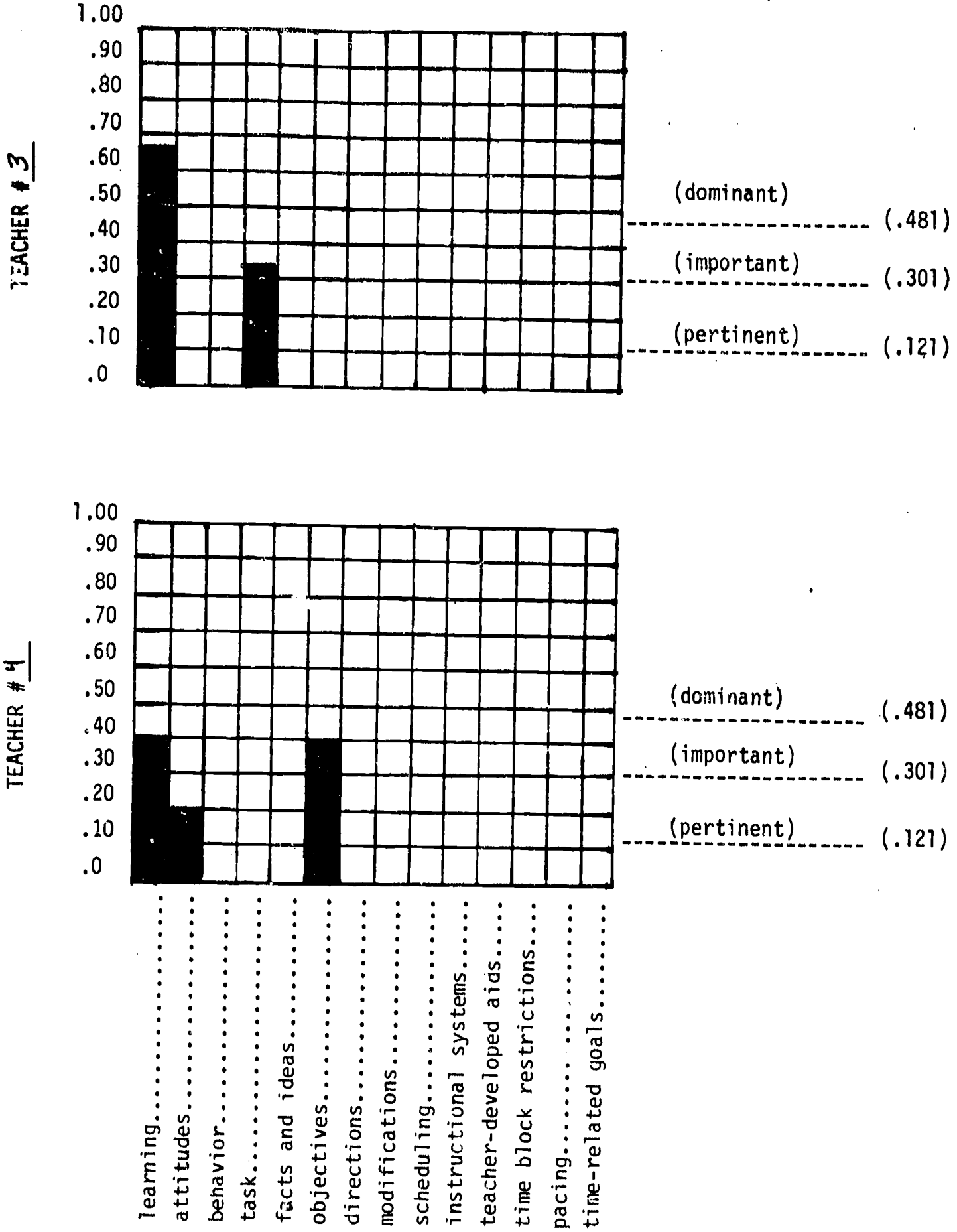
TEACHER # 2



(dominant) ---------- (.481)
(important) ---------- (.301)
(pertinent) ---------- (.121)

FIGURES 3+4

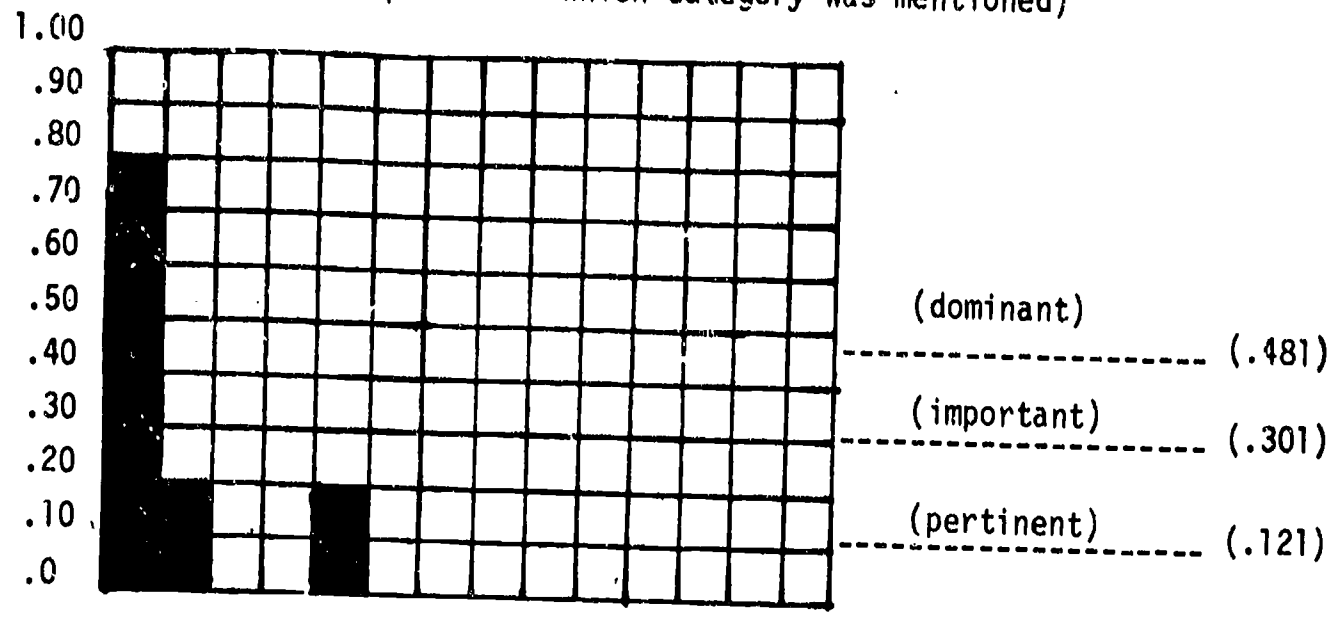
Teacher #3+4's Stimulated Recall Profile
(Proportion of decision points in which category was mentioned)



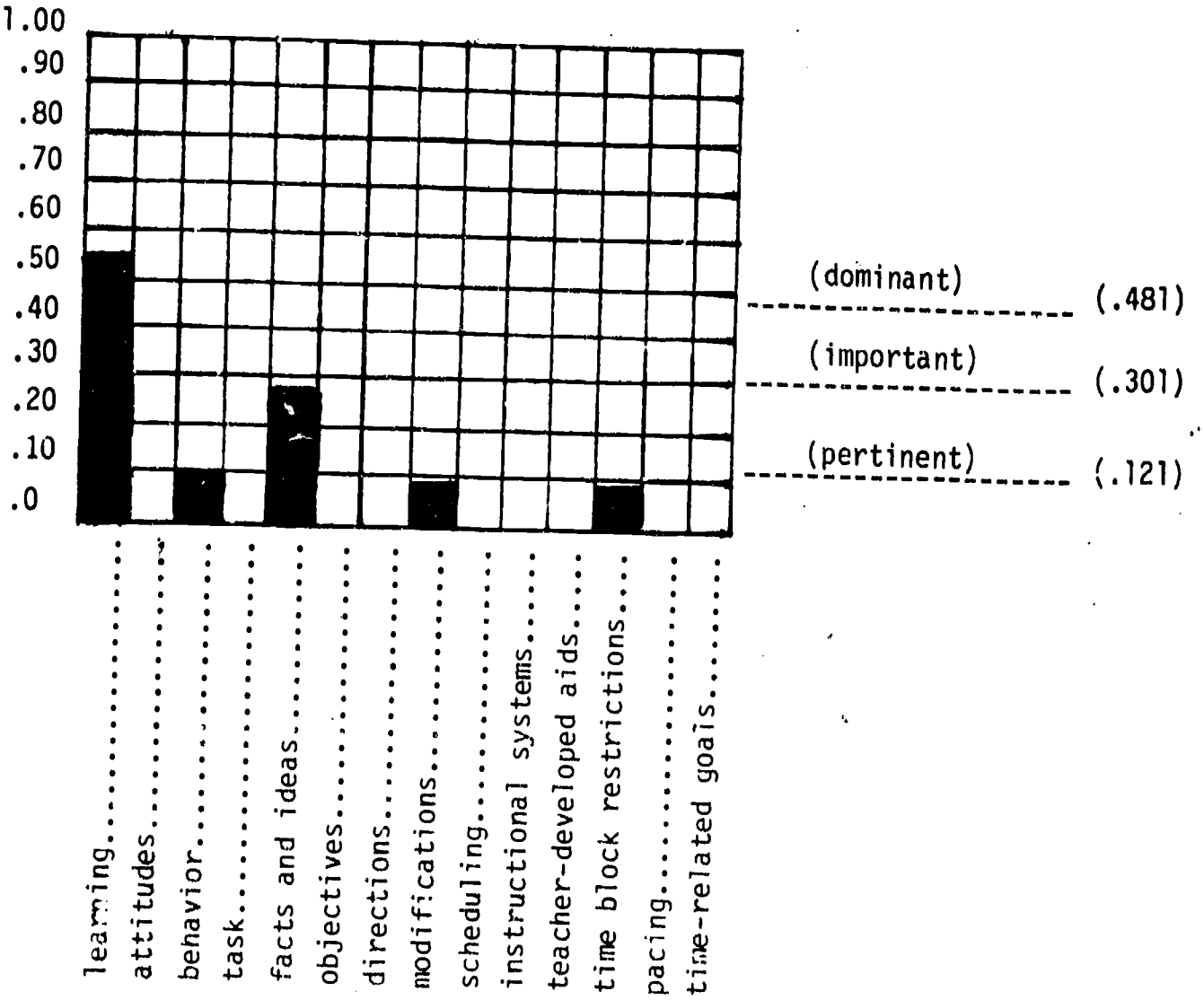
FIGURES 5+6

Teacher #5+6's Stimulated Recall Profile
(Proportion of decision points in which category was mentioned)

TEACHER # 5

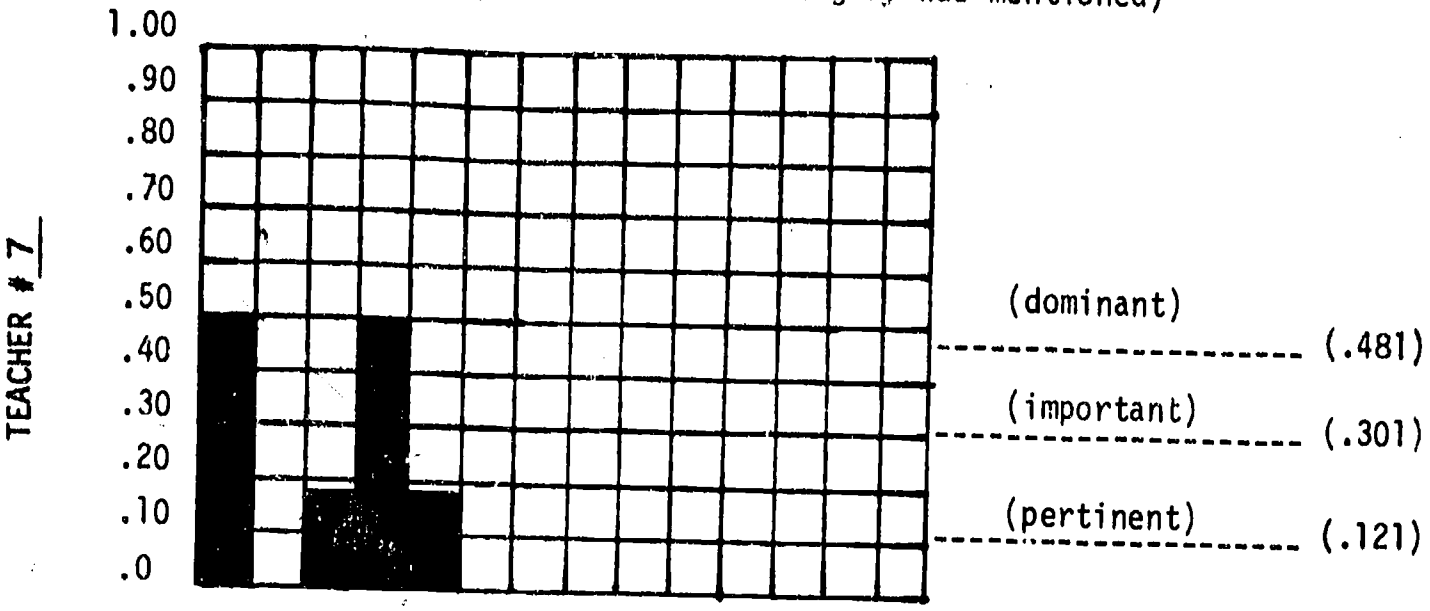


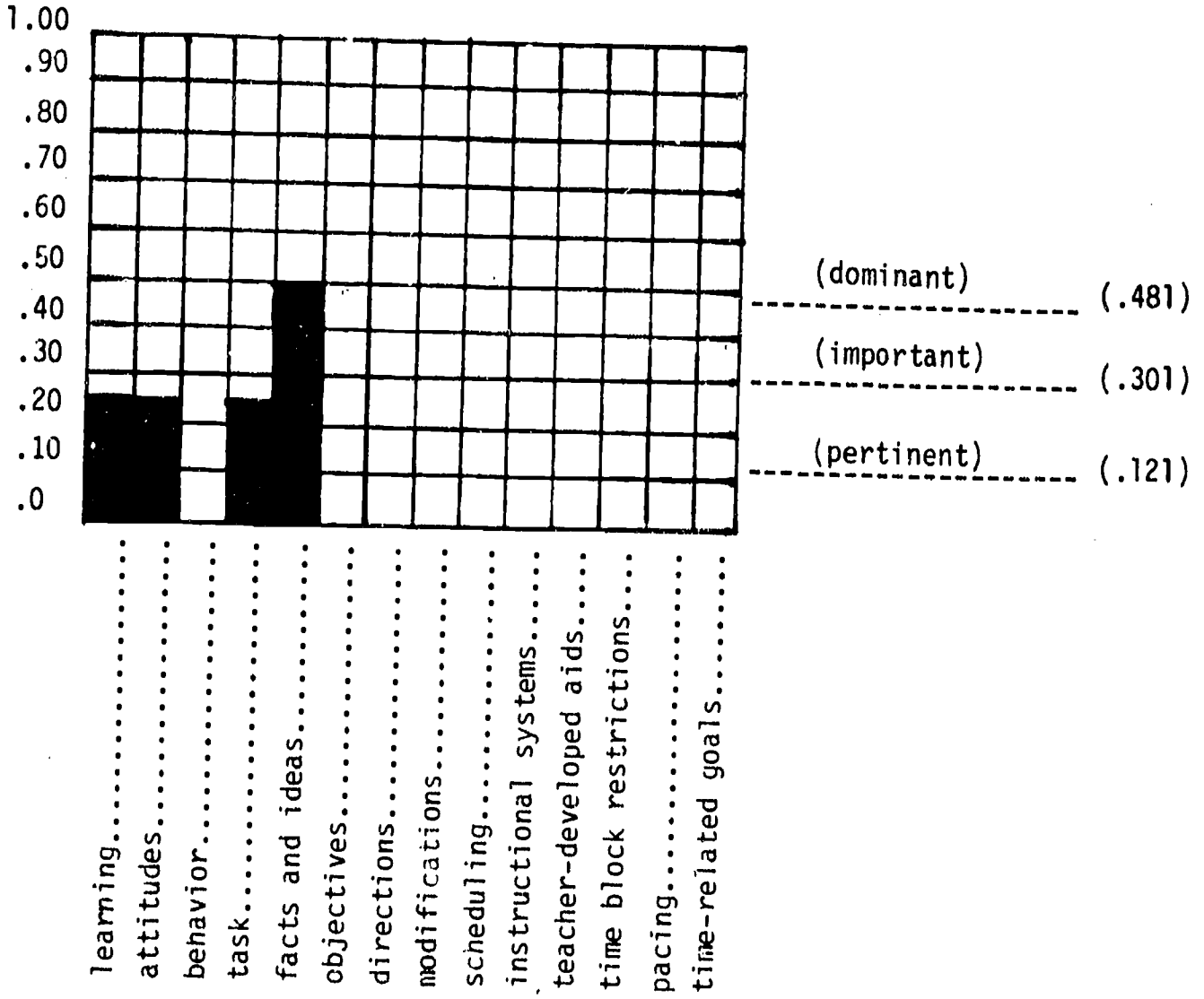
TEACHER # 6



FIGURES 7+8

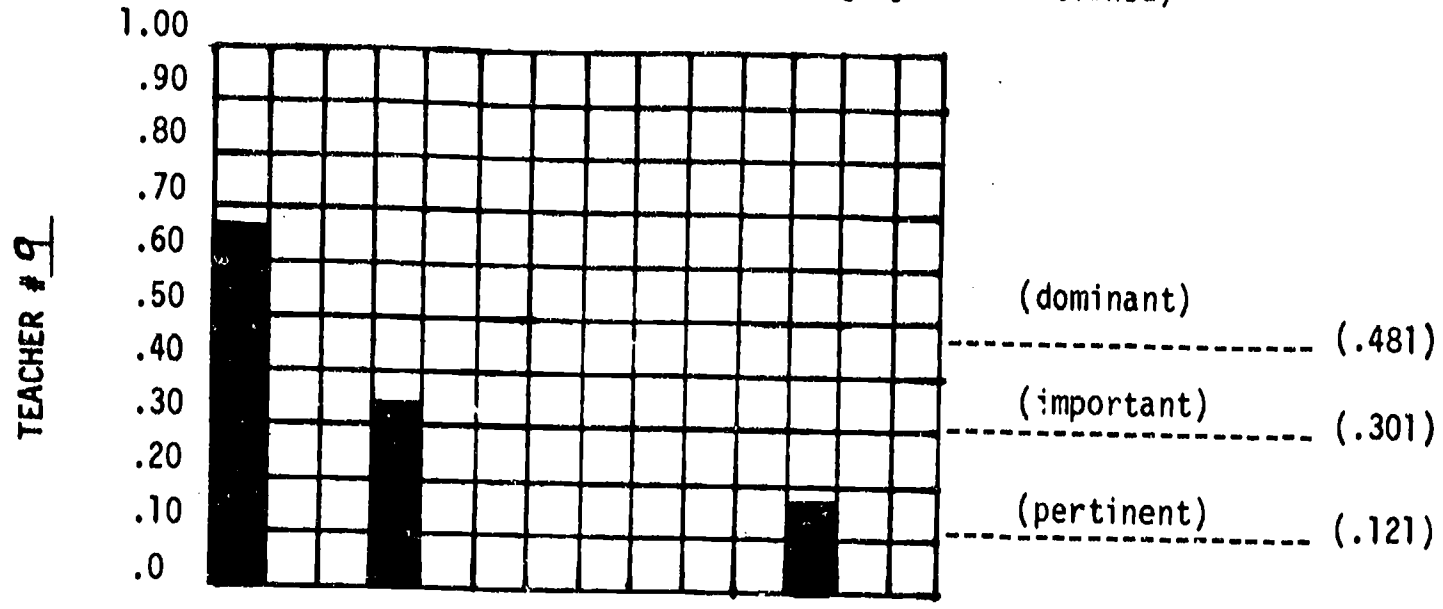
Teacher #7+8's Stimulated Recall Profile
(Proportion of decision points in which category was mentioned)

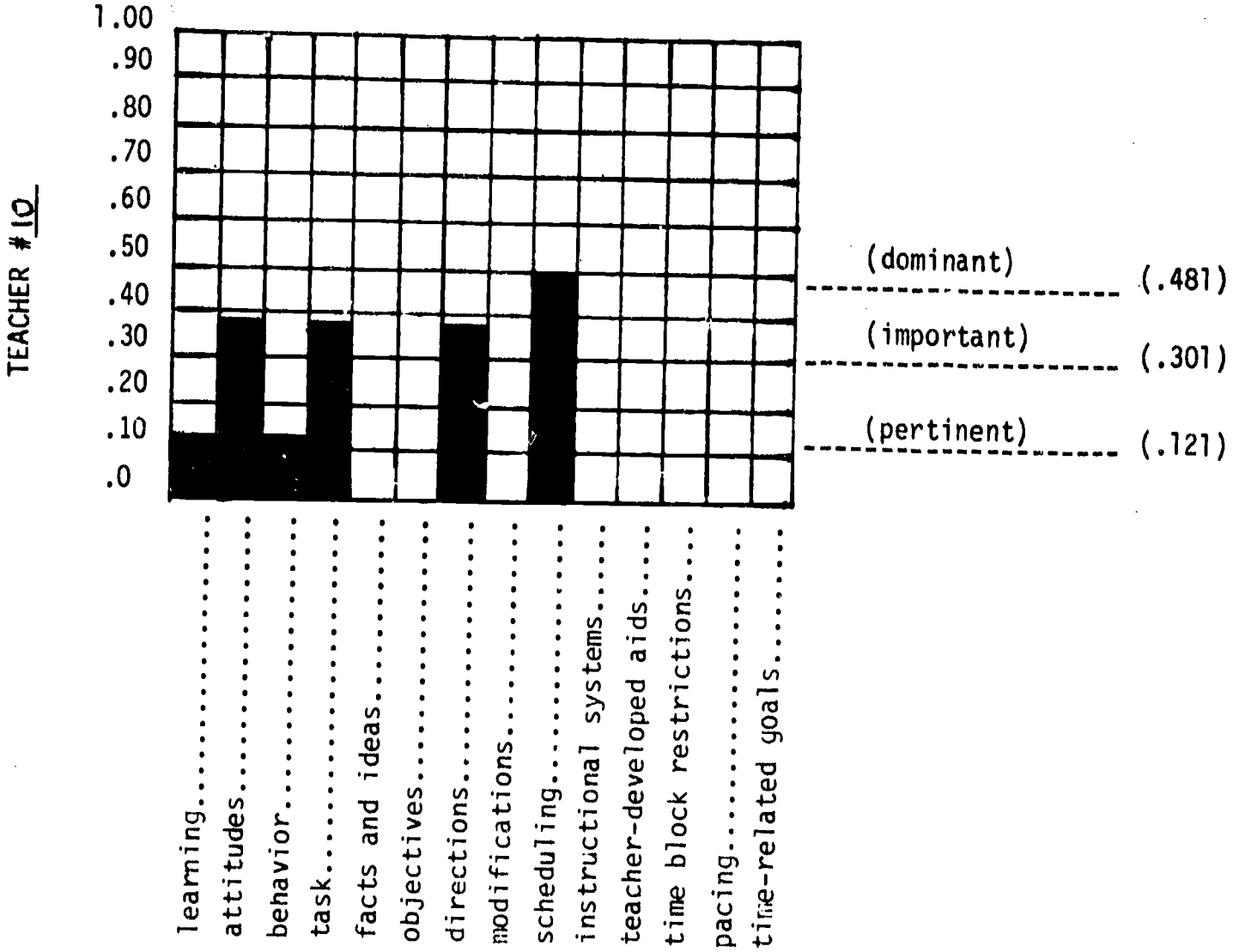




FIGURES 9+10

Teacher #9+10's Stimulated Recall Profile
(Proportion of decision points in which category was mentioned)





FIGURES 11+12

Teacher #11+12's Stimulated Recall Profile
(Proportion of decision points in which category was mentioned)