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ABSTRACT

This paper describes a study of the differences between problem solving skills of graduate students in education who have had full-time teaching experience and those who have not. Information was gathered to determine the extent to which the use of concepts in problem solving and the use of problem solving strategies differ among educators as a function of teaching experience. Ten subjects, five experienced and five nonexperienced educators, engaged in two tasks. In the first task, subjects were asked to provide written responses to four questions designed to elicit belief statements about education; the second task required subjects to think aloud as they responded to two written vignettes of typical classroom situations. Results indicate that the most fundamental determinant of teacher decision making is the structure of a teacher's knowledge which is greatly influenced by the types of teaching experiences that teacher has encountered. Five appendices, which comprise over 50 percent of the document, consist of a pretest, a think-aloud task (vignettes), an example of the analysis process, coding for causal statements and examples, and diagrams of problem solving activities. (Author/LL)

The Manifestation of Classroom Experience in the Problem Solving of Teachers

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RUNNING HEAD: CLASSROOM EXPERIENCE

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Abstract

This paper describes a study of the differences between the problem solving of graduate students in education who either have or have not had full-time teaching experience. Part of this endeavor utilizes a *Conceptual Orientation* analysis--a new method for analyzing think aloud or written protocols from teachers for comments that suggest the knowledge structure of an individual in the context of their beliefs about education. This approach overcomes four of the shortcomings of a previous methods for mapping knowledge structures (i.e., semantic-ordered trees) by (a) utilizing only terms provided by the subject in the representation of the subject's knowledge, (b) minimizing the imposition of structure on the subject's response by the researcher, (c) preserving the qualitative differences between the conceptual categories supplied by the subjects, and (d) providing evidence for how concepts are related to each other in the context of beliefs systems. A second analysis used in this study is an adaptation of Voss, Greene, Post, and Penner (1983) method for studying problem solving skill in ill-structured domains such as political science. These analyses were performed in order to determine: a) the extent to which the use of concepts in the problem solving of educators differs as a function of teaching experience and b) the extent to which the use of problem solving strategies differs as a function of teaching experience.

Ten subjects, (5 Experienced and 5 Non-Experienced educators) were engaged in two tasks. In the first task, subjects were asked to provide written responses to four questions designed to elicit belief statements about education. These responses, along with others collected from pilot subjects, were used to create the coding system for *Conceptual Orientation.* This coding system, as well as an adaptation of Voss et.al.'s (1983) method, was applied to responses to the second task, which required subjects to think aloud as they responded to two written vignettes of typical classroom situations.

Results indicate that a) the complexity of the tasks influences the complexity of problem solving strategy use, b) the overall problem solving strategy use of experienced subjects was slightly more complex than that of non-experienced subjects, c) the frame of reference used by members of the experienced group was different from that used by the non-experienced group (resulting in differences in perception of the problem, the use of causal reasoning statements, and the types of solutions offered), and d) the experienced subjects were more likely to focus on concepts that relate to students' internalized needs and bases for building understanding while non-experienced subjects were more likely to focus on concepts that relate to how instructional activities can be used to improve student performance in the classroom. General findings support a General Cognitive Framework (Wolfe & Ranney, in preparation) that suggests that the most fundamental determinant of teacher decision making is the structure of a teacher's knowledge which is greatly influenced by the types of teaching experiences one has encountered.

The Manifestation of Classroom Experience in the Problem Solving of Teachers

Since the mid 1970s, studies of teaching have become focused on the thinking of teachers as they perform instructional tasks. Prior to that time, research concerning classroom instruction was heavily influenced by the process-product paradigm that emphasized the analysis of overt behaviors of the teacher and students and how these behaviors correlate with indicators of student achievement (Shulman, 1986). In the mid 1970s, researchers began describing teachers in terms of information processing systems (e.g., Joyce, 1978-1979; and NIE, 1975) in the sense that the teacher receives and interprets cues from the classroom environment, constructs an internal representation or model of the present situation, integrates or compares that information with previously existing models of classroom phenomena, and makes decisions for future behavior based upon prescriptions for the best course of action given a specific set of conditions. This report is indicative of the drastic change in perspective from the previously held behavioral position.

Because of this change in perspective, a number of new methodologies have been created for studying the thinking of teachers. Although there are numerous forms of data analysis available for studying teacher cognition (e.g., ethnography, case study, laboratory tasks, etc.), only two will be discussed here because of their particular relevance to the aspect of teacher thinking investigated in this paper: a) semantic-ordered trees and b) process-tracing methods (i.e., think-aloud and stimulated recall). The reader is referred to Clark and Peterson (1986), Kagan (1990), or Shavelson and Stern (1981) for a more thorough discussion of these and other methodologies employed in the study of teacher thinking.

The *semantic-ordered tree* method is a research technique used to create maps or pictorial displays of the representational systems (knowledge structures) held by teachers. These representations are similar to the conceptual maps created by Chi, Feltovich, and Glaser (1981) in their study of problem solving in physics. The basic objective for creating these maps is to get an idea of how the conceptual understanding of an individual with respect to a particular domain of knowledge affects problem solving, reasoning, thinking, or decision-making. Typically, semantic-ordered trees are created by asking the subject to brainstorm and generate a list of terms or phrases that are relevant to the given concept or idea. Often this set of responses is expanded by providing the subject with a list of relevant terms or phrases and asking him to extend the original list. The next step requires the subject to group the words into categories and to label them. Finally, the subject is asked to organize the categories hierarchically and to describe the relationships between them (Kagan, 1990; Roehler, Duffy, Conley, Herrmann, Johnson, & Michelsen, 1990; Strahan, 1989). Similar methods for creating conceptual networks for teachers have been explored (e.g., Ammon & Hutchinson, 1989; Krause, 1986; and Leinhardt & Smith, 1985) by having the researcher (rather than the subject) construct the networks or similar descriptions of the teacher's representational systems based upon the subject's responses to interviews or written questions.

The semantic-ordered tree method has been used to assess teachers' conceptual understandings of their *content domain* (e.g., mathematics, reading, etc.). Leinhardt and Smith (1985) have suggested that a teacher's understanding of the content domain influences the manner in which information is structured when presented during instruction. However, many authors have suggested that teaching relies on at least *two* domains of knowledge: content knowledge (of the substantive area being taught) and pedagogical knowledge (of children, learning, and how these variables relate to content) (e.g., Ammon & Hutchinson, 1989; Leinhardt & Smith, 1985; Borko & Livingston, 1989; Shulman, 1987; and Wolfe & Ranney, in preparation). It is likely that methods similar to the semantic-ordered tree approach can be utilized to tap into a teacher's *pedagogical knowledge* as well as content knowledge. Such conceptual maps would be interesting from two perspectives. First, we could identify how teachers' pedagogical beliefs influence their behaviors toward students during instruction. Second, we could identify how content knowledge and pedagogical knowledge interact in producing a teacher's classroom behaviors. Creating conceptual networks for an individual's knowledge in both of these domains would provide a more complete picture of the teacher's knowledge structures relevant to teaching. Unfortunately, it is unclear how the conceptual structures captured by the semantic-ordered tree method are precisely related to a teacher's classroom behaviors. As Kagan (1990) points out, there seems to be at least *some* relationship between a teacher's pedagogical knowledge and instructional activities. For example, evidence has been offered that at least some classroom behaviors (e.g., responsive elaboration during reading instruction) are related to both the complexity and the coherence of a teacher's semantic-ordered tree (Herrmann, 1987; Johnson, 1987; Johnson & Duffy, 1986; Roehler & Reinken, 1989).

There are four general problems with the semantic-ordered tree method. First, when the conceptual networks are created by the researcher rather than the subject, the validity of the tree is highly suspect. On the other hand, when subjects construct the trees it is difficult to obtain responses that are constructed in the context of realistic teaching tasks. For example, a list of terms generated while brainstorming is much less likely to be representative of the knowledge used in instructionally-relevant tasks than would be a list of terms generated while considering activities for a lesson on a given topic. Unfortunately, the task of creating a semantic-ordered tree is difficult to perform in any realistic teaching situation. The second problem is created by providing subjects with a list of terms used to supplement the result of the brainstorming activity. Because of this practice, it is likely that the subject will include terms in the final version of the tree that would not have been apparent to him or her otherwise. It is not difficult to imagine a situation in which an individual, seeing a list of task-relevant terms, thinks to himself "Gee, I didn't think of that word, but I probably should include it in my list." If a conceptual network is intended to be a map of the knowledge structures of an individual, it is likely that exposing a subject to a list of words relevant to the task will distort that subject's performance to some extent. Therefore, it is probably unwise and counterproductive to cue subjects in such a manner.

The third problem is closely related to the issues of the realism of the task and the authenticity of the responses. Since (a) the task of brainstorming relevant concepts for a given situation is not very similar to the type of thinking that occurs in the classroom and (b) the terms added to the list may not be representative of the concepts as they are understood by the individual, the *relationships* among the concepts as represented by the semantic-ordered tree method may be suspect. That is, unless ideas

and concepts are shown to be related to each other in both a realistic context as well as in a meaningful manner, it is difficult to determine how such concepts would be related to each other under the normal conditions in which they might be used. Because semantic-ordered trees are constructed under contrived circumstances such as these, their representativeness for the underlying concepts as understood by the individual is questionable.

The fourth problem with semantic-ordered trees is the scoring process. The general strategy that has been adopted for examining semantic-ordered trees ignores some interesting qualitative individual differences because it emphasizes only the number of terms generated, their relationships as indicated by the subject, and the coherence of these relationships as judged by the researcher (Roehler, et. al., 1990). Another interesting sources of information given by a semantic-ordered tree, the set of labels used for the categories generated by the subject, is not accounted for by this scoring approach. Because the traditional scoring only considers quantifiable differences, information concerning the frame of reference for an individual's conceptual understanding of the domain of interest is lost in an attempt to reduce the complexity of the data.

Process-tracing methods, like think-aloud and stimulated recall, are techniques employed in the study of both thinking processes and representational structures. Although traditionally used to uncover the processes of thinking and reasoning, the data from these tasks are often rich with concept-laden statements allowing for analysis of conceptual structures as well. The think-aloud method, as used in studies of teaching, requires the teacher to verbalize all of his or her thoughts while engaged in planning activities, evaluating classroom materials, or interpreting written or audio/visual classroom stimuli. The responses of subjects are usually audio- or video-taped and these recordings are often transcribed to written form in order to facilitate analysis. Responses are analyzed by imposing a coding scheme, often created by the researcher, on these data. Coding systems are created in order to simplify or summarize the complex data that are provided by the subject. The think-aloud technique relies on the assumption that the activity of speaking while performing a cognitive activity allows relatively direct access to short-term memory and the thinking processes that are occurring at the time. However, because the act of teaching requires constant verbal communication, and engaging in thinking aloud would interfere with the teaching process, most studies employing think-aloud protocols rely on less ecologically valid tasks than are encountered in the classroom (e.g., reflections on written or video-taped vignettes). As a result, the utility of the data from such studies is questionable. Nevertheless, the think-aloud technique is presently one of the strongest methods for realizing the thoughts of teachers. Its general merits and limitations are discussed in detail by Ericsson and Simon (1984).

The stimulated recall method consists of replaying a video- or audio-taped performance by the subject (most often during teaching) while the subject recalls and reports his or her thoughts during the episode. Although such retrospective techniques are criticized by both Nisbett and Wilson (1977) and Ericsson and Simon (1984), the stimulated recall method is utilized extensively in studies of teaching. The questions raised concerning stimulated recall emphasize the lapse of time between performance of the activity and verbalization. In think-aloud tasks, it is assumed that the immediacy of verbalization allows for direct reporting of the contents of short-term memory. However, in stimulated recall tasks, verbalizations are suspect because the subject does not report the content of his thoughts until some time after the task's completion.

This delay eliminates direct access to short-term memory and allows for personal interpretations and theories (e.g., *a priori* hypotheses) held by the subject to interfere with the reporting of the actual thoughts processed during the task. As a result, stimulated recall data are suspect.

The problems associated with the think-aloud and stimulated recall techniques constitute major limitations of the study of teacher cognition. For the think-aloud method, the general lack of ecological validity for the *task* makes it difficult to determine the extent to which the verbalizations of subjects represent processes that are relevant to teaching in the classroom. For the stimulated-recall technique, the validity of the *technique* is suspect. Since the technique does not directly tap the content of thinking during the activity, it is reasonable to assume that this process may tap the contents of some cognitive structures instead. Because it is difficult to obtain a direct transcription of the thinking of teachers during the instructional process, it is difficult to determine the extent to which the interactive thoughts of teachers differ from their *a priori* theories and beliefs about education. Until more accurate methods are introduced, however, stimulated recall and think-aloud protocols will remain popular methods for data collection in studies of teacher thinking.

The purpose of this paper is to explore a method for gleaning individual differences between teachers' conceptual structures from verbal or written data. The goal is to create a system that allows individuals to provide only their own words as they think about a problem (cf., Ranney, 1988) and to preserve the qualitative/categorical differences between individuals that are apparent in their conceptual maps. The proposed method overcomes the four problems associated with the semantic-ordered tree method a) by only utilizing terms that are provided by the subject (i.e., not providing the subject with a list of terms from which to choose), b) by minimizing the imposition of conceptual structure by the researcher (i.e., not requiring the researcher to create a conceptual map according to his or her interpretation of the subject's responses), c) by eliciting conceptual descriptions in the context of an individual's beliefs about education, and d) by preserving the qualitative differences between the categories implicit in a subject's responses (i.e., not merely recording the number of terms and relationships between those terms in the subject's responses). Furthermore, because the approach adopted here utilizes the think-aloud method, the subject is more likely than in the semantic-ordered tree approach to demonstrate thinking processes similar to those that would occur in the classroom environment.

The next section of this paper describes the theoretical framework for teacher thinking upon which this study is based. The framework describes how the pedagogical knowledge structures of teachers are composed from a constructivist/information-processing perspective. Following that, a description of the subjects and the methods for data collection and analysis are described. Finally, the results are discussed as well as future directions for this research.

Teacher Cognition

The framework of teacher cognition adopted for this study was described in detail in a previous paper (Wolfe & Ranney, in preparation). The General Cognitive Framework (GCF) for teacher cognition suggests that teacher thinking relies on three basic components: a) knowledge representations, b) knowledge processing, and c)

metacognition (see Figure 1). In this framework, the teacher is viewed as a processor of information that comes from a complex environment such as the classroom. Because of the multiplicity of cues available at any given time, it is necessary for the individual to construct a simplified model of the classroom in order to make sense of the environment. This constructed model is compared to stored models of how the classroom environment operates. Decisions concerning the actions to take in a particular set of circumstances result from a comparison of such models.

Insert Figure 1 Here

The most central feature of the GCF is the knowledge representation system. In this context, knowledge representations are defined as the schematic structures that represent internalized models of the classroom. These schemata contain the concepts and the relationships between them that are necessary for understanding, interpreting, and making decisions based upon classroom stimuli. In the GCF, knowledge processing refers to the modes of thinking by which a teacher acquires knowledge and manipulates existing knowledge, while thinking about issues relevant to education (i.e., reasoning). Basically, knowledge processing in teachers accounts for how knowledge structures or models of the classroom are created from their experiences and how existing knowledge is utilized in generating and comparing models of the classroom while determining future courses of action. Metacognition refers to one's own awareness of memory and thinking as well as their control or regulation. Metacognitive activity accounts for how one monitors, plans, and regulates mental energies while considering specific problems encountered during teaching.

As previously mentioned, knowledge structures play central roles in the thinking of teachers. Since they serve as points of reference for interpreting cues from the environment (i.e., constructing models of a particular situation) and because they serve as explanations of the relationships between variables that influence classroom interactions, the knowledge structures of teachers may represent the most fundamental component of the decision-making process in teaching. These knowledge structures come in three forms: a) episodic, b) declarative, and c) scripted. *Episodic knowledge* is derived from experience and stored primarily in the form of memories of specific events. These memories serve as the foundation for other types of knowledge. They are important not only because they serve as a point of reference for interpreting new experiences, but also because generalized attributes for a given concept may be realized and stored in the form of either declarative or scripted knowledge through the comparison of sets of similar experiences.

Declarative knowledge is equivalent to factual knowledge--ideas that can generally be specified as true or false. At the most basic level, these concepts have defining or typical attributes and simple contextual information associated with them. As the number of these associations grows (by learning), declarative concepts become more complex, abstract, and propositional in nature. These complex concepts may begin to lose their concrete meaning by becoming more closely associated with operational meanings (i.e., they may become tied to the conditions under which they

are most often used). At the highest level, concepts held within the declarative structures form the embedded beliefs or implicit theories of a teacher. Such beliefs consist of sets of causally-related abstract concepts that form the bases for one's values and understanding of the classroom. Similarly, *scripted knowledge* is more abstract than memories, and is also separated from mere memories by its generalized representational meaning. Scripts are conceptual structures that preserve temporal relationships by generalizing across sequences of events that are often encountered as we interact with the environment. Teachers' scripts are based on sequences of events that occur in educational contexts.

For our purposes, declarative and scripted structures are important because they serve as the basis for many of the decisions that a teacher makes while teaching. That is, declarative and scriptual knowledge are the primary materials from which schematic models of the classroom are constructed, and by which cues from the classroom are interpreted and used to construct models of the present situation. The importance and the role of these structures is further discussed by Wolfe and Ranney (in preparation), so it will only be emphasized here that knowledge representations play a critical role in the thinking of teachers. One purpose of this study is to determine how this interplay between knowledge representations and knowledge processing influences problem solving skills as they are used by educators while they reason through classroom problems.

The GCF identifies four types of declarative and scriptual schemata related to teacher thinking: a) institutional, b) classroom, c) children, and d) content. *Institutional schemata* relate to the functioning and goals of the educational system as it relates to society. Such schemata are evidenced by a teacher's knowledge of the power structure of the educational system, the goals of education, the role that education plays in society, and knowledge of one's self with respect to these factors. *Classroom schemata* revolve around a teacher's knowledge of the roles of students and the teacher in classroom interactions pedagogical methods, assessment, and the knowledge of one's self with respect to these variables. A teacher's *schemata of children* represent knowledge of the nature of children, thinking, development, and how a child's social and cultural background influences learning. *Content schemata* contain concepts relevant to subject matter knowledge, the structure or organization of a particular domain of knowledge, and how this information relates to a content's relevance and difficulty for children. These categories were generated a priori from the literature concerning teacher thinking and teacher education (e.g., Ammon & Hutchinson, 1989; Lawrence, 1991; Ropo, 1987; Shulman, 1987) as well as the author's personal experience with preservice and inservice teachers. Detailed descriptions of these categories are given in Table 1, and they serve as definitions of the conceptual categories adopted in the later empirical analyses.

Insert Table 1 Here

As Wolfe and Ranney (in preparation) point out, one of the major differences between the conceptual structures of experienced and novice teachers is the salience of

certain concepts for these groups. For example, when reflecting upon one's own teaching, Wolfe and Ranney suggest that master teachers tend to focus on both students as the center of instruction and the meaningfulness of the content to be delivered, while novices focus on the teacher's behavior and the progression of the lesson. The concepts that each of these groups of teachers emphasize in post-lesson reflections seem to differ substantially.

To illustrate this point, consider two teachers (A and B) who respond to a question about the cause of a particular student's learning difficulties. Teacher A comments on the student's intellectual ability and motivation to learn. Teacher B, on the other hand, refers to the child's emotional state or experiential background. The differences in such responses may be indicators of important differences in the manner in which teachers conceptualize the educational process (i.e., knowledge structures). More specifically, it is assumed here that these differences are indicative of a fundamental difference in the structure of teachers' knowledge about student thinking and learning.

Hypothetical conceptual maps for Teacher A and Teacher B in the above example are provided in Figure 2. In these diagrams, primary or central concepts to the explanation are emphasized by bold print, secondary or implicit concepts are shown in parentheses, and lines suggest connections between related concepts as realized by the teacher. The response of Teacher A seems to indicate that this individual's knowledge structures concerning how students learn contain the concepts of Ability and Motivation as central components in describing student behavior. The concepts of Experience and Emotional State, although not directly mentioned in the example, have been included as secondary elements in the conceptual map for illustrative purposes. It is assumed that the concepts of Experience and Emotional State are related to Ability and Motivation, but because they are not stated as direct influences on student learning, they are presumed to only be associated weakly or indirectly. On the other hand, Teacher B's response seems to indicate that the concepts of Experience and Emotional State are directly related to Student Learning, but Ability and Motivation may only be indirectly related (if at all). To account for these differences, Wolfe and Ranney (in preparation) introduced the term *conceptual orientation*. A teacher's conceptual orientation refers to her tendency to consider or weigh more heavily a specific concept or set of concepts or to focus on particular interpretations of these concepts when accessing or utilizing her knowledge structures. It is assumed that this phenomenon arises because of the organization of the schemata of teachers (as shown in Figure 2). Concepts that have many connections to other concepts and serve as subsumers for more specific concepts are prime candidates for being most salient for the individual during cognitive activity. Such concepts are referred to here as *conceptual foci* (cf., highly embedded propositions in explanatory coherence networks; Schank & Ranney, submitted).

Insert Figure 2 Here

It is important to explain how this theoretical position is related to methodological practice in research on teacher thinking. It was previously mentioned that in the construction of semantic-ordered trees, it may be more valuable to allow the subject to impose structure on maps of his or her conceptual structures than to provide the subject with a list of supplemental terms. It was also suggested that the semantic-ordered tree method is problematic in the nature of the task itself (i.e., the ecological validity of brainstorming terms for instructionally-relevant tasks). It seems that both of these problems can be ameliorated to some extent by engaging the subject in think-aloud tasks as they reason through a realistic classroom situation. The tasks would require the individual to provide the terms to be used for subsequent analyses while engaging the subject in a more realistic task. Of course, reasoning through a contrived situation is not equivalent to the thinking that would occur in the classroom, but it is more compatible than more context-free brainstorming for terms and concepts related to a specific topic. It is expected that this change in practice should also lead to better representations of the relationships between concepts if the think-aloud tasks require the teacher to engage in reasoning and to give statements of beliefs.

A final problem with the semantic-ordered tree method is the technique used to score the representational maps of a teacher. Until this point in time, researchers have not attempted to analyze the organization of the concepts contained in a conceptual network. As Kagan (1990) suggests, it is difficult for researchers to justify the designation of one map as "qualitatively better" than another. (Nb., Schank & Ranney, submitted, have found only mild inter-coder reliability among coders of beliefs and their relations.) This is simply because too little is known about the nature of the conceptual structures of master teachers and how their knowledge may differ from the knowledge of their less able or less experienced peers. As a result, researchers who have adopted the semantic-ordered tree methodology have opted for quantifying the number of terms, chunks, and relationships between these units as a measure of the quality of an individual's conceptual structures. In short, this is an overly simplistic view of how conceptual understanding may affect a teacher's classroom performance. These points bring up the second purpose of this article: to examine an alternative method for analyzing the conceptual structures of teachers and to determine how experiential knowledge alters an educator's conceptual orientation.

The remainder of this paper describes a method for examining the qualitative differences between the conceptual orientations of experienced and non-experienced educators and exposes the differences between these groups with respect to this method of analysis. Because this study is exploratory in nature, the following, rather tentative, hypotheses were adopted:

1) Individuals with differing levels of experience in education will focus upon different problems and provide different solutions to those problems.
2) Individuals with differing levels of experience in education will focus upon different concepts when both reasoning through a problem and generating constraints and solutions for that problem.
3) There will be differences in the extent to which experienced versus non-experienced educators use causal reasoning in their formulation of a solution to an educational problem.
4) There will be differences in the conceptual orientation displayed by experienced and non-experienced educators as they propose solutions and consider given information.

Methods

Subjects

Experienced subjects (E) were defined as individuals seeking a doctoral degree in education who have least four or more years engaged in full-time teaching or related activities in which they were responsible for directing the education of children on a weekly basis. These individuals may or may not have been parents. Non-Experienced subjects (N) were defined as individuals seeking a doctoral degree in education who have spent two or less years engaged in teaching or a related activity in which they were responsible for directing educational activities for children on a part-time basis. These individuals have not been parents.

Subjects were selected from a pool of volunteers from a highly selective School of Education in the Western United States. The admission standards for the school are considered stringent enough to provide access to a group of subjects with a relatively high level of knowledge in the fields of education and psychology. All subjects were in the process of completing doctoral studies in education at this university. In order to create the pool of subjects, approximately 20 individuals completed a biographical data survey designed to highlight the variety of educational and teaching experiences they had had. Members of this pool were categorized according to their levels of experience as defined above. From this pool, ten individuals (five Experienced and five Non-Experienced) were randomly selected for the study.

Data Collection

Subjects were engaged in two tasks. In the first task, 15 subjects were asked to provide written responses to a set of four open-ended situations designed to elicit their beliefs through reasoning. The topics for the four questions were adopted from Lawrence's (1991) study of levels of pedagogical understanding in preservice teachers. These topics (Pedagogy, Evaluation, Goals, and Roles) represent four fundamental concepts contained in the previous description of the GCF (Wolfe & Ranney, in preparation). Subjects' responses were not timed. Materials for this task are located in Appendix A.

For the second task, ten subjects were presented with four written vignettes. Subjects were asked to think aloud as they reasoned through the situation and arrived at a solution. These vignettes provided varying levels of detail in the description of the situation. The topics upon which these problems are based were the same as those adopted in the first task in order to facilitate the comparability of responses from one activity to the next. Subjects were presented with two permutations of the four vignettes. Each group (Experienced and Non-Experienced) had an equal number of members exposed to each permutation of the vignettes. As an initial activity for establishing rapport and becoming familiar with the materials, a practice vignette was presented to the subject, and his or her verbal responses were monitored and feedback was given by the interviewer in order to insure the subject understood the activity. Otherwise, little probing was employed. Responses were audiotaped for later analysis. Subjects were informed that their performance was not timed. Materials for this task can be found in Appendix B. Only two of the vignettes are analyzed in this paper (Pedagogy and Roles). These vignettes are referred to in this paper as Problem Child and Class Rules respectively.

Data Analysis and Results

The analysis procedures consist of three general phases. The first phase was generating the conceptual categories to be used for the Conceptual Orientation analysis. This part was performed by analyzing 45 writing samples from 15 subjects who were part of the original subject pool. Most of these subjects were in the final sample. The second phase was to parse the verbal data into manageable units for analysis. Finally, the Conceptual Orientation analysis procedure and an adaptation of Voss, et.al.'s (1983) method for explicating problem solving skill use were applied to the verbal protocols of ten of these subjects. These three phases serve as the organizational framework for the following section concerning the data analysis and results. Because the data analysis procedures are quite involved, Figure 3 provides an overview of the data analyses. An example of the results of each step of the process is shown in Appendix C.

Insert Figure 3 Here

Data Analysis

Conceptual Categories:

The first phase in analyzing these data was to generate conceptual categories that could serve as a basis for categorizing individuals' responses according to their preference for using specific concepts. The first step taken in this direction was completed by generating a priori categories based upon the literature on teaching (e.g., Ammon & Hutchinson, 1989; Lawrence, 1991; Ropo, 1987; Shulman, 1987) as well as recollections from the first author's experiences as a teacher educator. This original set of categories was supplemented by perusing the 45 writing samples taken from 15 subjects for any statements implying causal attribution for a student's behavior. Because the focus of this activity was on attributions for student's behavior, no definitions or examples for the Institutions category were generated and Content was only defined in a limited sense. This exercise resulted in the list of definitions and selected examples found in Appendix D.

Parsing the Data:

The primary data of interest in this study were the think aloud protocols generated in the second task. Because this study did not focus on teachers' metacomments, the first pass through the data was performed for the purpose of deleting any redundant comments or comments that referred to the individual's performance or the individual's assessment of the task and its difficulty.

The second pass through the data was performed with the intent of getting a picture of each subject's general approach to resolving the dilemma presented in each vignette. This task was accomplished by creating an outline of each protocol.

Outlines were generated by first identifying each general shift in the subject's line of reasoning. Most of these shifts in focus, referred to here as boundaries between *problem solving units*, were accompanied by either a pause (more than three seconds) or a metacomment in the form of a goal statement or indication of self- or task-monitoring (accomplished by referring back to the original protocol for verification). The problem solving unit in this context is similar to a paragraph of written text in length. Step 1 in Appendix C shows a protocol that has been condensed by eliminating redundant comments and metacomments and divided into problem solving units.

The next step in generating outlines for each protocol was to code the problem solving units according to their intent or purpose. A simplified version of the Voss, et. al.'s (1983) General Problem Solving Structure coding scheme was created for this purpose. The original coding scheme was found to be both too elaborate for the purpose of this paper and too focused on reasoning strategies. The modified scheme is shown in Table 2. There are five possible purposes for a unit: a) Framing, b) Constraint, c) Solution, d) Support, and e) Summary. *Framing* refers to any attempt on the part of the subject to create a frame of reference for the problem. This is often accomplished by discussing the relevance of information or by relating the problem to past experiences. *Constraints* refers to a section of the protocol in which the subject identifies limitations or conditions which should be considered in formulating a solution to the problem. *Solution* refers to a section in which a solution is proposed by the subject. *Support* units provide arguments or reasons that show why a particular solution is warranted or would be successful. *Summary* units are intended to provide a general overview of the problem solving approach or to condense a long section of the protocol. Occasionally, solutions are added as an afterthought during summary units. A sixth code descriptor, *Medley*, was created to indicate that the subject performed more than one of these activities within a given problem solving unit. Outlines were used in the analysis to identify the types of problem issues and solutions considered by each subject. An exemplar protocol that has been condensed into outline form and coded according to these categories is presented in Appendix C under Step 2. In this outline, problem solving unit codes are indicated by bold letters. Any specific issue either identified or considered is underlined and any specific examples provided by the subject are indicated in italics.

Insert Table 2 Here

From each outline, diagrams of the subject's problem solving activity (similar to those produced by Voss, et. al., 1983) were constructed. These diagrams were constructed by referring to the codings for each problem solving unit (taken from the outlines). Boxes in these diagrams indicate sets of problem solving units that reference the same problem issues. According to Voss and Post (1988), problem solving in ill-structured domains, such as the social sciences, involves three general strategies: a) framing the problem, b) reasoning through the situation, and c) evaluating and summarizing the chosen approach. The problem solving units from the protocols were partitioned accordingly. Typically, our subjects framed the problem,

then engaged in a reasoning medley involving statements of constraints and support, and ended the problem solving activity with a short summary statement. Lines in these diagrams indicate connections between problem solving units as evidenced by reliance upon prior Framing or Constraint statements. These diagrams and the associated outlines served as the primary data in the ensuing discussion of the interplay between knowledge representations and knowledge processing in educators' reasoning. The diagrams may be found in Appendix E.

Conceptual Orientation:

The final step in parsing the data was to examine the condensed protocols for causal statements and to perform a Conceptual Orientation analysis of them. A *causal statement* was defined as any statement that explicitly or implicitly suggested that a specific concept or condition may be the reason for a student's behavior, the existence of a problem for the student, or the existence of a classroom problem or situation that would influence a child's behavior. Such a statement would be consistent with Schön's (1988) notion of "giving reason" to the child's behavior. Generally, statements that qualified as causal statements were statements that suggested "if-then" relationships, stated the "reason for" some condition, stated that a specific condition would arise "because" of some other condition (cf., Schank & Ranney, submitted for syntactic cues for causality), or stated a "fact" or a "counterfact" about the nature of children or classroom interactions. For each of these causal statements, the associated problem issue and solution was identified. A summary of the coding system for the causal statements and examples of each type of statement is shown in Appendix D. Examples of causal statements from a protocol are shown in Step 3 of Appendix C.

The causal statements identified in the previous paragraph served as the data source for applying the conceptual categories that were generated from the writing samples. For each statement, a judgement was made concerning what conceptual category explained or served as a theme for the causal statement. The *theme* of a statement refers to the source or the cause of a student's behavior. In some cases, more than one cause could be identified in a statement. For these cases, multiple codes (themes) were applied to the statements. An example of coded causal statements from a protocol is shown in Step 4 of Appendix C.

Based upon these codings, Conceptual Orientation diagrams were constructed. An example of such a diagram is shown in Figure 4. The diagrams show the concepts the subject relied on when providing reasons for the existence of a problem issue, reasons for a child's behavior, or beliefs that restricted possible solutions. It should be noted that the temporal relationships have been preserved by the vertical layout of these diagrams. For example, Figure 4 shows how E1 first made a comment concerning Self with respect to the Same Clothes problem issue. She then proceeded to introduce a Value comment concerning both the No Friends and the Same Clothes issues (e.g., " ... Kids are very status conscious and (if) somebody wears the same clothes twice ... kids pick up on that. ... I had kids in class who ... were on food stamps, but they wore Reboks because it was a status symbol, something ... that was important to them. So it could be that this business about wearing the same clothes to school a couple of days a week could be related to not having many friends in the class.") When a subject mentions that two conceptual themes could be associated in such a manner, the conceptual category is placed in the column for each of the indicated problem issues and the labels are connected with a double bar (e.g., ===). Finally, when more than one conceptual theme is included in a causal statement about a

particular problem issue, the multiple conceptual categories are connected with vertical lines like this:

```
|  Environment  |
|  Pedagogy     |
```

Insert Figure 4 Here

These diagrams, along with frequency counts for the codes for each group will serve as the primary data in the analyses of the differences between knowledge representations (and some reasoning) with respect to levels of experience. From the data in Step 4 of Appendix C, Conceptual Orientation Diagrams were constructed for each subject from the response given for individual vignettes. These diagrams are presented in Appendix F.

Results

In the following sections, the results of two basic analyses are described. First, findings from analyses of the problem solving strategies and the interpretations and solutions of these problems are presented. These analyses should shed light on two questions: "Does problem solving strategy use differ for these two groups?" and "Does the content of the problem solving units differ for these two groups?". The data for these analyses were taken from the coded outlines, the associated diagrams of the problem solving activities (Appendix E), and the condensed protocols (e.g., Appendix C, Step 1). Second, the results of the Conceptual Orientations analysis are given. This analysis addresses the issue of whether or not Experienced and Non-experienced subjects focus upon and use concepts differently when they think about educational problems. The data sources for this analysis are the coded causal statements extracted from each protocol (e.g., Appendix C, Step 4) and the associated conceptual orientation diagrams (Appendix F).

Problems and Solutions:

The analysis of the problems and solutions, similar to Voss et. al.'s (1983) method of analysis, focuses on the problem solving strategies of subjects in each group. The analysis of the content of these problem solving units was performed as a qualitative analysis of the text contained in the Framing and Solution units identified in the problem solving strategy diagrams.

Problem Solving Strategies:

Generally, the Problem Child vignette was more complex than was the Class Rules vignette. For the Class Rules vignette, only a single issue was indicated by the text (a student stated that the teacher should let the students make the rules for the class). For the Problem Child vignette, four issues were identified in the text: a) a child has Trouble Learning the material, b) the child constantly Raises Hand and asks for explanations, c) the child has No Friends, and d) the child often wears the Same Clothes to class. Two other issues, the child has low Self Esteem and the teacher needs to Get Information, were alluded to in the protocols but were not explicitly stated in the vignette. In most cases, these two issues were stated as possible overriding causes or constraints for several of the given issues.

The outlines for the problem solving approaches were studied for the structure of each subject's general problem solving approach. Diagrams of the problem solving strategies used by each subject for the two vignettes are shown in Appendix E. Generally, both E and N subjects approached the Class Rules vignette, which was rather simple in structure, with a linear reasoning strategy (e.g., Figure 5). In other words, subjects tended to address the single issue presented without considering other possible issues as a subgoal to be addressed later. Both the E and N groups used approximately the same number of Framing, Constraint, Solution, and Summary units; these units constitute the basic framework of the Voss and Post (1988) ill-structured problem solving model. However, E subjects seemed to use a more complex form of reasoning than did subjects in the N group, as evidenced by the larger number of Support problem solving units. However, the difference is not statistically significant ($\chi^2 = 5.07$, df = 4, p = .28) (see Table 3).

Insert Figure 5 Here

Insert Table 3 Here

Similar results were found when Problem Child protocols were compared between the groups. Because the Problem Child vignette was more complex in structure (i.e., contained more given issues), the resulting problem solving diagrams (Appendix E) were less linear and more branched than were the diagrams created for the Class Rules protocols. Branching in these diagrams indicates the sequential subgoaling of multiple issues with respect to the given vignette. As evidenced by the typical diagrams for each group shown in Figure 6, there is a marked difference between the reasoning of E and N subjects that was not evidenced for the Class Rules

vignette. The diagrams of the problem solving approaches for members of the E group show that these subjects tended to approach the Problem Child vignette by first Framing the problem, usually by interpreting the given information or relating it to previous experiences of their own. Next, they considered one or more of the problems by acknowledging the Constraints of the situation, proposing Solutions, and providing Support for them. Solutions were often accompanied by descriptions of how the individual dealt with a similar problem in his or her own classroom. Finally, most members of the E group finished their problem solving activities with a Summary of the actions that they would take to resolve the situation. On the other hand, members of the N group were more likely to focus upon single (rather than multiple) issues and thus also solutions, were less likely to provide examples or specificity concerning how the solution could be implemented, and were less likely to consider the Constraints of the situation or provide Support for their solutions than were members of the E group (see Table 4). Again, these differences are not statistically significant ($\chi^2 = 4.18$, df = 4, p = .38). However, the frequency counts collapsed across vignettes emphasizes this point at a marginally significant level ($\chi^2 = 9.15$, df = 4, p = .06) (see Table 5).

Insert Figure 6 Here

Insert Table 4 Here

Insert Table 5 Here

It is also interesting to compare the number of words used by each group in their protocols. For the Class Rules vignette, N subjects averaged 641 words for the protocol while E subjects averaged 873. For the Problem Child vignette, N subjects averaged 433 while E subjects averaged 848 words for the protocol. It seems that most of this difference is due to the extensiveness of the real-life experiences that the E subjects referenced in their protocols. It is particularly interesting to note that E subjects were more consistent in the number of words they used regardless of the complexity of the vignette while N subjects actually used less words in their protocols for the (apparently) more complex vignette. Overall, members of the E group used more words in their responses than did N subjects. A t-test of the total number of

words used by each subject on these two vignettes indicates a significant difference between these two groups ($t = -7.13$, $df = 9$, $p < .001$)

Problem Framings and Solutions:

Because of the central nature of Framing, Constraint, and Solution statements for problem solving in ill-structured domains (Voss & Post, 1988), further qualitative and quantitative analyses were performed on these aspects of N and E responses. Table 6 (Class Rules) and Table 7 (Problem Child) were produced by perusing the condensed protocols for the Framings, Constraints, and Solutions proposed by each subject. In the first column, the name of the problem being addressed is given as well as concepts upon which the problem was framed or constrained. The second column shows the general solution adopted for the referenced problem. The third column identifies the subject's group (E or N) and identification number. The last two columns provide excerpts of the text upon which the first two columns are based. These two tables reveal two general tendencies in the problems as they were framed by the E and N groups.

Insert Table 6 Here

Insert Table 7 Here

The first tendency is for the groups to propose different general Framings and Solutions to the problems. For the Class Rules vignette, only one issue was realized by the set of all subjects (probably due to the simplicity of the text). The general Framings and Constraints that were placed on the vignette dealt with concepts related to the student's age, cultural backgrounds, understanding of the purpose of school, sincerity, and competence to make decisions. Examples of each of these categories can be found by referring to the Framing column of Table 6. Although the E and N groups used approximately the same number of Framings for this vignette (see Table 8), there were small (non-significant) differences between which of these Framings subjects of each group chose to impose upon the problem. Age was equally likely to be used by each group. However, members of the E group also cited cultural background and understanding the purpose of school while members of the N group cited sincerity and competence. Notice that there is no overlap between the general categories that relate to student understanding and general personality attributes for the two groups.

Insert Table 8 Here

For the Problem Child vignette (see Table 7), as mentioned earlier, multiple issues were realized by both groups. The manner in which subjects used framings with these issues differentiated between the groups with this vignette. For example, the overall number of Framings use by E subjects is only about two-thirds of those used by N subjects (E = 8 and N = 13) (see Table 9). However, this difference is not significant ($t = -1.33$, $df = 9$, $p = .11$). The two issues that account for this difference are Trouble Learning and Self Esteem. For these two issues, N subjects used nine Framings while E subjects only used two. Furthermore, it should be noted that within the Trouble Learning issue, the Framings used by E subjects only dealt with the child's lack of background knowledge while the Framings used by N subjects focused on knowing the student's ability level, the adequacy of instruction for meeting individual needs, and the student's ability to comprehend the material (see Table 10). Note that these differences are similar to those found for the Framings of the Class Rules vignette.

Insert Table 9 Here

Insert Table 10 Here

In general, the number of solutions proposed to the Class Rules and Problem Child vignettes were about the same for each group (11 each). However, the focus of the solutions for each group varied. For example, in the Class Rules vignette E subjects gravitated toward: a) asking for students to suggest rules and compromising with them in order to achieve a satisfactory set of rules for the class, and b) discussing the structure and purpose of school with the students. On the other hand, N subjects were more likely to elect to: a) allow the students to generate rules as long as they respected individual rights, and b) discuss the purpose of rules and how a democracy functions. Furthermore, N subjects were less consistent as a group in their agreement upon a solution. While subjects from the E group only proposed solutions that fell into four of the seven general approaches, the responses from the N group encompassed all seven of the approaches. Frequencies for solution types for the Class Rules vignette are shown in Table 11. Solutions for the Problem Child vignette were less revealing regarding this analysis, but were more interesting with respect to the content of the solution statements.

Insert Table 11 Here

The second general tendency in the two groups pertains to the nature or content of the Solutions that they proposed. For the Class Rules vignette, E subjects tended to propose Solutions using group discussion and described specific strategies and goals which would enable the teacher to guide the discussion in a desired direction. These Solutions also emphasized providing reasons to the students or eliciting reasons from the students. For example, E2 said "In response to her concerns about fairness, I would explain that society has expectations of schools, which are basically responsibilities. And that I want to fill that expectation that society has of me." His comment indicates a concern for letting students know why rules are used in schools. Meanwhile, E5 suggested "I would ask them to write down their expectations, their rules. They have to defend their rules, and support their rules" as an indication that she would require students to provide reasons for the rules they generate. E subjects also gave specific and detailed examples (often engaging in a hypothetical conversation with students), and they stated the types of responses and arguments that they would expect students to raise. Finally, members of the E group often referred to the social implications of the vignette and tended to deal with its dimensions on a global or macroscopic level. This is evidenced by E1 when she states "... but the reality is that we're all in this room together. Students should be able to do whatever they want. But, we can't always do everything we want because it infringes on the rights of other people."

On the other hand, the Solutions proposed by N subjects seemed less consistent as a group. Most often, N subjects expressed opinions and beliefs about the implications of the vignette. They tended to be interested in being fair to students and expressed an interest in giving them freedom rather than providing reasons or eliciting reasons from the students. Examples of this are provided by N3 in her statement that she would "allow the students to be in on the rule-making process. I get to be in on it too. ... The task for the class is to come to a consensus. If they can't come to a consensus, I'll have to enforce them since I'm the authority figure. But, that's kind of an incentive to get them to not sit and fight for the whole period of time." Although the content of their solutions were quite specific about the nature of the rules that were or were not desired (e.g., sharpening pencils, eating food in class), they provided few examples of the dialog that students and teacher would engage in when arriving at these rules. On the whole, the solutions of the N group were rather vague and general in descriptions about the approach that they would take in solving the dilemma. Subject N1 provides an example of this by stating "If this is for the elementary school or secondary school, I think it's perfectly OK for the students to make up their own rules. ... The student's comment that she thinks that students should be allowed to do whatever they want is an interesting one, and would be a great instructional moment."

For the Problem Child vignette, similar group differences were found. E subjects proposed solutions that suggested individualizing the problem for the student by helping the child build an understanding of the material (e.g., building background knowledge) or dealing with the individual needs of the child (e.g., building autonomy

or self esteem). For example, in response to the Trouble Learning problem, E1 suggested "Bring whatever the experience is into the classroom to the maximum extent possible so the kid would have hands-on experience with it. So if kids haven't grown plants, you grow plants with them." As another example, E4 suggested the following solution to the Raises Hand problem. "I would respond to him by coming over and staying with him. Rather than explaining it to him again, I'd give him a chance to try and solve it and feel some success." Their solutions also emphasized using classroom activities in a prescriptive manner with the explicit goal of internalizing change in the thinking of the child. Again, an example E5 suggested that in order to solve the Raises Hand problem, she would "work on things that would build his self-esteem, such as giving him extra-credit assignments that I know he could do and know that he understands it. Make him feel good about himself by completing these assignments outside of class." Finally, members of the E group provided many examples from their experiences in the classroom and often compared the situation or their solutions to their own experiences as teachers.

The N group appeared more likely to implement changes in the environment of the classroom (e.g., altering materials or implementing group work), but seldom explained how these changes were related to internal changes in the child. Rather, it was implicitly suggested that change in the child would follow. As an example, N1 simply said "I can adapt the material to his unique means as a learner ..." in response to the Trouble Learning problem. Another example of this failure to describe causal connections between activities and goal states was provided by N4's statement that "... the process of restating what you just said in different words ... is good. ... It's a better idea to get a conversation going about the points you're making than to just run through a bunch of points and hope that the kids are understanding." Also, rather than building an understanding of the child in the context of classroom activities, N subjects were more likely to address these issues outside of the classroom in private conversations with the child. Furthermore, the N group tended to propose group situations as solutions to problems rather than individualized work with the child. An example of this tendency is given by N5's statement that "The fact that he doesn't have many friends could be remedied by putting him in situations where he needs to work with other children." They also provided few specific examples of how they would implement these solutions, as demonstrated in the previous example. In general, the approaches of the N group seemed based less upon building an understanding of the individual in order to formulate a solution than they were to simply create a solution for the problem.

Conceptual Orientations:

Diagrams of the Conceptual Orientation shown by each subject are presented in Appendix F. These diagrams show the concepts the subject relied on when providing reasons for the existence of a problem, reasons for a child's behavior, or beliefs that restricted possible solutions. These diagrams are analyzed here in two ways. First, the complexity of the diagrams (e.g., the number of concepts, the number of multiple themes, and the number of related or connected issues) is noted. Second, the content of the diagrams is studied.

With respect to the complexity of the diagrams, Table 12 shows that for the Class Rules vignette the number of single concepts focused upon by the E group was considerably greater than those of the N group ($Mean_E = 5.8$ and $Mean_N = 3.4$). Furthermore, the E group tended to use more complex conceptual descriptions in their

reasoning. This is evidenced by the fact that they used more multiple themes in their descriptions of the problem than did N subjects ($Mean_E = 2.0$ and $Mean_N = 0.6$). For the Problem Child vignette, this difference is magnified due to the complexity of the text. For example, $Mean_E$ for single concepts = 11.0, and $Mean_E$ for themes using multiple concepts = 3.2, with $Mean_E$ for connections between issues = 1.6. The mean values for the N group on these measures are 7.0, 1.8, and 0.4 respectively. These differences are summarized in Table 13. It should be noted that *all* of these tests are significant at the $\alpha = .05$ level.

Insert Table 12 Here

Insert Table 13 Here

With respect to the content of the diagrams, two tables were constructed in order to simplify the interpretation. Table 14 summarizes the content of the Conceptual Orientations for the Class Rules protocols and Table 15 summarizes the content of the Conceptual Orientations for the Problem Child protocols. For the Class Rules vignette, so few themes were cited by either group that it is difficult to judge differences between group performance on this task. It does seem, however, that for the Class Rules vignette subjects generally cited Management and Values & Beliefs as the most relevant concepts for this vignette.

Insert Table 14 Here

On the other hand, a number of differences were identified between the content of the conceptual themes used by the two groups for the Problem Child vignette (see Table 15). For instance, examination of the column totals reveals rather large differences between groups with respect to the issues for which conceptual themes were provided. While the E group dealt with the Trouble Learning, Raises Hand, and No Friends problems about equally, the N group were much more concerned with the Trouble Learning problem and dealt with the Same Clothes and Raises Hand problems with about the same intensity. It is also interesting to note that none of the N subjects provided conceptual themes for the Self Esteem problem while E subjects allocated approximately nine percent of their thematic statements to this problem.

Insert Table 15 Here

Another set of interesting differences is revealed by the row totals for each thematic concept. A two-factor (Group X Theme) ANOVA indicated that there was a significant interaction between group membership and the use of specific themes. These results are presented in Table 16. E subjects seemed to focus their conceptual orientation on the Emotional, Pedagogical, and Management themes while N subjects provided most of their statements in the Intellectual, Emotional, and Pedagogical categories. For example, in response to concerns for the student's self esteem, subject E4 used the following multiple theme reasoning (including Emotional, Pedagogical, and Management concepts) to describe how she would resolve the problem: "I would incorporate bringing him into the discussions ... Find out if he has any interests, things that he does well. And see if I couldn't support him... so that... he learns how to work with other kids and other kids learn how to work with him. Collaborative learning groups, puzzle groups probably is a very good... learning situation for this kid. ... Yes, self-esteem is probably the focus." On the other hand, subject N2 typifies the approach of her group by using the following combination of Intellectual, Emotional, and Pedagogical themes to describe the Trouble Learning problem: "So (group work) may result in this boy getting some of the extra attention he needs, and it may even help him make a few more friends while he's working in these small groups. ... He probably doesn't ... have the same kind of background or have reached the same achievement levels of other students in the class and needs to do some catching up." Hence, there seemed to be fairly large differences in the conceptual orientations of these groups with respect to Management and Intellectual categories.

Insert Table 16 Here

Discussion and Conclusions

Discussion

Four points can be raised concerning the results of this study. *First, it seems that the complexity of the tasks used in studies of the role of experience in problem solving in teachers has some bearing on the magnitude of the observed differences between subjects.* For example, the Class Rules vignette was simpler than the Problem Child vignette in the sense that much fewer issues were given in the text of the former vignette. As a result, the general structure of the problem solving

approaches taken by both groups were fairly similar for the Class Rules vignette (e.g., all were linear in structure). However, the complexity of the Problem Child vignette suggested differences between both the structural paths that experienced and non-experienced subjects used to arrive at solutions for the situation and the number of Constraint and Support episodes provided by each group. This suggests that there may be a minimal level of task demand before one can differentiate among the types of problem solving strategies used by different subjects--a notion generally supported by both traditional views of measurement theory and studies of experts and novices (Berliner, 1986). From this study, it would seem that at least two contrasting issues would necessarily be introduced to a subject in order to reveal differences in the problem solving strategies used (cf., Schank & Ranney, submitted, on the importance of contrasting alternatives in assessing problem solving differences). This conclusion is also supported by the difference in the number of words used by subjects in each group. Experienced subjects used approximately the same number of words in both vignettes even though they contained different levels of complexity. Perhaps this is because of an upper limit to the amount of effort a subject is willing to put into a protocol. On the other hand, non-experienced subjects actually used fewer words for the more complex problem (Problem Child), suggesting that they may not be as able to process the multiplicity of information required to cover all aspects of the problem.

The second point evidenced by these findings is that the differences in problem solving strategy use between experienced and non-experienced subjects were rather trivial. This finding is consistent with the framework that served as a theoretical background for this study. For the Class Rules vignette, both groups demonstrated a linear approach to reasoning through the situation. For the Problem Child vignette, experienced subjects used problem solving strategies that branched, rather than remained linear, in nature--as did those of non-experienced subjects. These findings are also consistent with those of Voss et.al. (1983). Furthermore, experienced subjects were more likely to use Constraint and Support units rather than relying chiefly on Framing, Solution, and Summary units as was the case with non-experienced subjects. These findings might suggest that there are small differences in the thought processes that experienced and non-experienced subjects use to arrive at solutions to educational problems. The General Cognitive Framework adopted for this study would suggest, though, that these differences are due to the complexity of the structure of the schemata of experienced teachers. Because of their experiences in the classroom, the schemata of experienced educators are likely more complex and interconnected than those of their non-experienced counterparts. If this were the case, it would follow that experienced teachers tend to realize more restrictions under which a problem must be solved, while being able to provide more evidence concerning why a particular solution would be successful.

A supporting conclusion drawn from this study is that experienced and non-experienced educators use different frames of reference and adopt different solutions for educational problems. Experienced subjects seemed more likely to use Framings for the vignettes that focused on the student's sources of meaning (e.g., cultural background or experiential knowledge) while non-experienced subjects seemed to use Framings for the problem that focused on relatively stable traits (e.g., sincerity, decision-making competence, and ability level) or the materials or activities available to the student (i.e., the adequacy of the instructional approach).

The content of the solutions proposed by the two groups showed similar trends. For example, in the Class Rules vignette experienced subjects tended to

suggest solutions in which students and the teacher would engage in compromises while arriving at a set of classroom rules in the context of a discussion of the purpose of school. Experienced subjects suggested using group discussions and provided reasons to students for classroom rules. They often provided specific examples of hypothetical conversations and stated the types of responses that they would expect students to give. Non-experienced subjects, on the other hand, would allow the students to generate rules as long as these rules respected the rights of individuals. The generation of rules would take place in the context of a discussion of the purpose of rules in general. They expressed a desire to be fair to students by giving them freedom, and made specific statements about the types of rules they would desire. However, they gave few examples of the (hypothetical) dialogs that would generate these rules.

When generating solutions for the Problem Child vignette, experienced subjects tended to suggest individualizing the problem and building on students' background knowledge. They also emphasized the need to deal with the emotional and social needs of the individual. Finally, experienced subjects described classroom activities in a prescriptive manner by providing examples of the direction that the solution would take, based upon their own teaching experiences. Non-experienced subjects suggested solutions to the Problem Child vignette that would require implementing a change in the classroom environment, but did not relate these changes to internal changes within the child. They also emphasized the use of group interactions rather than individualizing the instruction. Furthermore, their descriptions of solutions contained few specific examples.

This finding suggests that, although the process by which solutions are generated are not very different for experienced and non-experienced subjects, the way that a problem is perceived and the resulting solutions are quite different. Experienced subjects tended to focus on concepts that dealt with the internal functioning of children. As a result, their Framings and Solutions dealt with issues such as autonomy, self-esteem, and understanding in the child. Their notions of how classroom activities affected students were often described in the context of their own teaching experiences and thus suggested that they understood how these activities would impact children. Non-experienced subjects, on the other hand, tended to emphasize issues such as the environment of the classroom or relatively stable (e.g., personality) traits. They also were more likely to view classroom activities as a means to solving a problem rather than providing motives and reasons for implementing a particular solution.

Because the level of education is similar for these groups, it is safe to assume that these differences may be due to one's level of experience in the classroom. In the context of our cognitive framework, it would seem that the schemata of experienced subjects both a) are organized around conceptions of the child as a constructor of knowledge, and b) that they view classroom activities in a causal relationship with a child's behaviors. On the other hand, non-experienced subjects seem to have organized their schemata around classroom activities and around childrens' behaviors with few connections between the two sets of concepts. As a result, the perspective that is taken by an educator with classroom experience seems to differ greatly from that of one who does not.

The fourth conclusion afforded by our analyses elaborates upon this notion. *Experienced subjects focus upon concepts that are very different than those used by*

non-experienced subjects when defining causal relationships within educational problems. Our study shows that experienced subjects cited significantly more concepts for both vignettes in their descriptions of the causes of student problems. They also were more likely to relate more than one concept to a student's behavior. In other words, they were more likely to cite multiple themes in their conceptual orientations to a problem. The concepts that differentiated between experienced and non-experienced subjects the most were emotional, managerial, intellectual, and pedagogical. Experienced teachers seemed most likely to state how a child's emotional needs for security could be satisfied by the way the teacher constructed a classroom environment in a way conducive to learning. On the other hand, non-experienced educators seemed more concerned with a child's intellectual ability and how the teacher can alter the instructional approach in order to improve classroom learning. This finding again suggests that experienced educators operate upon ideas that relate to children's internal functioning (e.g., social, emotional, and other bases for understanding) while non-experienced educators operate upon ideas that relate to the functional relationship between what is done in the classroom and student outcomes.

Conclusions

Evidence has been provided for the experiential base of knowledge in teaching. It is safe to conclude that the schemata used by teachers are, in part, a product of their experiences with children and that they constitute realizations of generalized ideas concerning the nature of content, children, classroom activities, and education as an institution. Our results indicate that, while the reasoning approaches used by educators differ little as a product of their classroom experiences, one's perception of a problem, the solutions that are realized, and the causal explanations offered for the chosen approach differ greatly. These findings are consistent with the General Cognitive Framework proposed by Wolfe and Ranney (in preparation) which suggests that the greatest determinant of decision making differences in teachers is the structure of a teacher's knowledge of the content they teach, their pupils, the dynamic structure of their classes, and the institutional character of pedagogy.

This paper also presents an analysis procedure that is useful for identifying differences in the knowledge representations of teachers. Conceptual Orientations appears to be a valuable tool for identifying differences in the ways that teachers attribute causes for student behavior. Such attributions and the beliefs that a teacher holds may be, as suggested by Wolfe and Ranney (in preparation), the most global and important level of teachers' knowledge with respect to understanding how teachers perceive educational problems and make decisions based upon these perceptions. This analytic technique overcomes many of the methodological problems associated with other methods (e.g., semantic-ordered trees) by allowing us to analyze the relationship between concepts as they are used in the reasoning of teachers. However, too little is known about how these concepts interact in order to produce a teacher's belief systems. It is suggested that future analyses should focus on broader aspects of teacher knowledge than was adopted in this study. For example, four general schemata for teaching were mentioned in the literature review for this article: a) Institutional, b) Classroom, c) Children and d) Content. Analyses of how concepts form beliefs about these issues could lead to the production of profiles of individuals' philosophical orientations for general and broad-based educational themes. As was evidenced in this study, experienced educators tend to show evidence for schemata of children that rely on ideas of children as builders of meaning and satisfiers of needs.

Non-experienced educators, however, relayed ideas of children as having various intellectual capacities that can be expanded through specific interventions in the classroom. Such generalizations may be more fruitful in the study of how the knowledge that a teacher holds impacts on one's decision making.

Future endeavors to study the schemata of teachers should focus on these four components of teachers' knowledge structures. The analytic methods created by Lawrence (1991) adequately evaluate the structure of teachers' knowledge in the context of reasoning tasks by assessing the multidimensionality, interconnectedness, and levels of abstraction contained in belief statements. These characteristics are generally recognized as representative of well-developed schemas (Fiske & Taylor, 1991). However, little is known about the nature of the generalized schemata upon which teachers operate. As a result, it would seem wise to broaden the conceptual orientations analysis in order to create individual profiles that demonstrate how concepts work as a whole rather than as sets of independent units. This focus will be the topic of further analyses of these data.

References

Ammon, P. & Hutchinson, B.P. (1989). Promoting the development of teachers' pedagogical conceptions. The Genetic Epistemologist, 17(4), 23-29.

Berliner, D.C. (1986). In pursuit of the expert pedagogue. Educational Researcher, 15(7), 5-13.

Borko, H. & Livingston, C. (1989). Cognition and improvisation: Differences in mathematics instruction by expert and novice teachers. American Educational Research Journal, 26(4), 473-498.

Chi, M.T.H., Feltovich, P., and Glaser, R. (1981). Categorization and representation of physics problems by experts and novices. Cognitive Science, 5, 121-152.

Clark, C.M. & Peterson, P.L. (1986). Teachers' thought processes. In M.C. Wittrock (Ed.), Handbook of Research on Teaching (pp. 255-296). New York: MacMillan Publishing Company.

Ericsson, K.A. & Simon, H.A. (1984). Protocol analysis. Cambridge, MA: MIT Press.

Fiske, S. & Taylor, S. (1991). Social Cognition, Chapters 2 & 3.

Herrmann, B.A. (1987, April). The relationship between teacher education and prospective teachers' developing knowledge structures for reading and reading instruction. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C.

Johnson, J. (1987). Preservice teachers' knowledge structures as reflected in their teaching of lessons. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C.

Johnson, J. & Duffy, G. (1986, December). The relationship between preservice teachers' emerging knowledge structures and their practice. Paper presented at the National Reading Conference, Austin, TX.

Joyce, B. (1978-1979). Toward a theory of information processing in teaching. Educational Research Quarterly, 3, 66-77.

Kagan, D.M. (1990). Ways of evaluating teacher cognition: Inferences concerning the Goldilocks Principle. Review of Educational Research, 60(3), 419-469.

Krause, F. (1986). Subjective theories of teachers: Reconstruction through stimulated recall, interview, and graphic representation of teacher thinking. In M. Ben-Peretz, R Bromme, & R. Halkes (Eds.), Advances of Research on Teacher Thinking. Lisse: Swets & Zeitlinger, 159-171.

Lawrence, C.L. (1991). The development of educational epistemologies and levels of understanding of pedagogical concepts in preservice teachers' portfolios. Unpublished doctoral dissertation. Purdue University: West Lafayette, IN.

Leinhardt, G. & Smith, D.A. (1985). Expertise in mathematics instruction: Subject matter knowledge. Journal of Educational Psychology, 77(3), 247-271.

National Institute of Education. (1975). Teaching as clinical information processing (Report of Panel 6, National Conference on Studies in Teaching). Washington, D.C.: National Institute of Education.

Nisbett, R.E. & Wilson, T.D. (1977). Telling more than we can know: Verbal reports on mental processes. Psychological Review, 84, 231-259.

Peel, E.A. (1971). The nature of adolescent judgment. New York, NY: Wiley-Interscience.

Perry, W.G. (1970). Forms of intellectual and ethical development in the college years: A scheme. New York, NY: Holt, Rinehart, and Winston.

Ranney, M. (1988). Changing naive conceptions of motion (Doctoral dissertation, University of Pittsburgh, Learning Research and Development Center, 1987). Dissertation Abstracts International, 49, 1975B.

Roehler, L.R., Duffy, G.G., Conley, M., Herrmann, B.A., Johnson, J., & Michelsen, S. (1990). Teachers' knowledge structures: Documenting their development and their relationship to instruction. (Research Series No. 192). East Lansing, MI: Michigan State University, College of Education, The Institute for Research on Teaching.

Roehler, L.R. & Reinken, B.J. (1989, March). Inservice teachers' instructional effectiveness in response to staff development designed to create conceptual change. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.

Ropo, E. (1987, April). Teachers' conceptions of teaching and teaching behavior: Some differences between expert and novice teachers. Paper presented at the Annual Meeting of the American Educational Research Association, Washington, D.C.

Schank, P. & Ranney, M. (submitted). Assessing a model of on-line belief revision: A method for integrating interview and protocol data with explantory coherence. Paper submitted to the Procedings of the 14th Annual Conference of the Cognitive Science Society.

Schön, D.A. (1988). Coaching reflective teaching. In P.P. Grimmet & G.L. Erickson (Eds.), Reflection in teacher education (pp. 19-30). New York: Teacher's College Press.

Shavelson, R.J., & Stern, P. (1981). Research on teachers' pedagogical thoughts, judgments, decisions, and behavior. Review of Educational Research, 51, 455-498.

Shulman, L. (1986). Programs and paradigms. In M.C. Wittrock (Ed.), Handbook of research on teaching (pp. 1-150). New York: MacMillan Publishing Company.

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. Harvard Educational Review, 57(1), pp. 1-22.

Strahan, D.B. (1989). How experienced and novice teachers frame their views of instruction: An analysis of semantic order trees. Teaching and Teacher Education, 5(1), 53-67.

Voss, J.F., & Post, T.A. (1988). On the solving of ill-structured problems. In M.T.H. Chi, R.Glaser, & M.J. Farr (Eds.), The nature of expertise (pp. 261-285). Hillsdale, NJ: Lawrence Erlbaum Associates, Publishers.

Voss, J.F., Greene, T.R., Post, T.A., & Penner, B.C. (1983). Problem solving skill in the social sciences. In G.H. Bower (Ed.), The psychology of learning and motivation: Advances in research theory (pp. 165-213). New York: Academic Press.

Wolfe, E.W. & Ranney, M. (in preparation). A theoretical framework for the processing components of teacher cognition. Manuscript in preparation: University of California, Berkeley.

TABLES

Table 1: Schemata Definitions

Institutional Concepts: Ideas related to one's understanding of education as a social system. These concepts constitute an individual's understanding of:

1) the functioning of the school system (the functioning of school as an institution)
2) the goals of education and the roles it plays in society (the purpose of education)
3) the roles of various participants in the educational system (the part parents, administrators, teachers, government, business, etc., play in education), and
4) knowledge of one's self with respect to this system (one's own talents, needs, ideals and how they fit into the structure of education)

Classroom Concepts: Ideas related to one's understanding of the functioning of a classroom. These concepts constitute an individual's understanding of:

1) student and teacher *roles* in the classroom (the role of the teacher and students in the classroom and how it is established/maintained)
2) *management* of the classroom environment (the social/emotional environment of the classroom and how it is established/maintained)
3) *pedagogical* knowledge (the intellectual environment of the classroom and how activities/expectations influence it)
4) *assessment*/diagnosis/evaluation (the purpose of assessment and how it is used in the classroom), and
5) *knowledge of one's self* with respect to these concepts (one's own talents, needs, ideals and how they fit into the working of the classroom)

Children Concepts: Ideas about the nature of students, thinking, and development

1) *intellectual* ability or experience (how children think as a function of their ability or experiential background)
2) *emotional* security or self-esteem (how a child's emotional security or self-esteem influences their behavior in the classroom)
3) values or beliefs (how a child's values and beliefs relate to their functioning in the classroom)
4) *social skills* (how a child's social skills relate to the classroom atmosphere)
5) *motivation* (how a child is motivated and how this affects classroom performance)
6) family *environment* (how a child's cultural, religious, socio-economic background influences classroom behaviors)
7) *physical* well-being, health, safety (how a child's physical status influences learning and thinking)

Content Concepts: Ideas related to the structure of a substantive area, its difficulty for children, and its relevance to their lives

Table 2: Adaptation of Voss et.al.'s (1983) Coding System

Framing [Problem(s)]: Considers whether information is relevant or irrelevant, provides framework for problem, relates problem to experience or example, gives methods for finding more information

Constraints: Identifies limitations or conditions for a particular solution or problem

Solution: Suggests a course of action or provides an example of how it would work

Support: Provides reasoning or explanations for why a particular solution would work

Summary: Provides summary by reiterating or giving general overview of problem and solutions

Medley: Applies multiple operations on same problem. Most often this is done with constraints and solution.

Table 3: Frequencies for Problem Solving Units on the Class Rules Vignette

Group	Framing	Constraint	Solution	Support	Summary
Experienced	4	2	5	3	3
Non-Experienced	3	1	6	1	3

Table 4: Frequencies for Problem Solving Units on the Problem Child Vignette

Group	Framing	Constraint	Solution	Support	Summary
Experienced	8	4	9	6	3
Non-Experienced	7	1	8	1	4

Table 5: Frequencies for Problem Solving Units on Both Vignettes

Group	Framing	Constraint	Solution	Support	Summary
Experienced	12	6	14	9	6
Non-Experienced	10	2	14	2	7

Table 6 Summary of Problems and Solutions for Class Rules

Problem (& Constraints)	Solution	Sub	Framing	Action
Raises hand and makes statement (Age) (Cultural Background)	Students generate rules respecting individual rights during discussion shaped by teacher	E1	if this is little kids, I don't think that you're going to have this kid saying you should do whatever you want. if you did, you would find that the kids were a lot harder on themselves than the teacher would ever be. They would say things like, " if you talk back to the teacher you should get suspended." If it's high school, you're going to get kids saying "Yeah, we should be able to eat in class if we want to. We should be able to bring a radio if we want to. We should be able to read whatever we want to when we're here. We should be able to study whatever we want to in this class." So depending on how old the kids are, you're going to get different different responses. If we're looking at high school students, they're going to be old enough to understand the teacher's side of it as well. They're going to be old enough to understand the notion of power and authority because they've been alive for long enough that they've been dealing with adults in authority positions for a long time.	Say "So you think students should make all the rules. What do you think the rules for the class should be? And then start to discuss it. They can do it pretending that they are teachers. Not to be silly. Rather, take it as a positive thing "Let's pretend that you were the teacher." "Now if you were the teacher and you really want to have a fair class. What do you want? And how are you going to respect everybody's rights in the classroom?" And then I would probably lead the discussion into say, into the notion of what I want may be different from what the person next to me wants. "But the reality is that we're all in this room together. Students should be able to do whatever they want. But, we can't always do everything we want because it infringes on the rights of other people."
Raises hand and makes statement (Age)	Discuss purpose of rules & democracy Ask for suggestions, state expectations, & compromise to fit needs of class Discuss structure & purpose of school	E2	It's worked well in high school classes where children are ready and have had some experience in other classroom settings of discussing with their teachers "what do we expect for the school year." So it's compatible with their own experience. It hasn't worked well in intermediate classes where I've felt on the one hand that these children were unable to articulate some of their own views and where these children have also felt that it's the teacher's responsibility to set expectations.	Hopefully a fairly animated discussion about the purposes of school and why we're in school. I wouldn't run away from this and use it as an excuse to put the students down and say "Well look, I'm in control. This is my classroom. We'll do what I want." Not necessarily suggesting that the students would have the upper hand or I would have the upper hand. I would also ask students for their comments and specific suggestions. And ask this particular student to just explain herself to tell the rest of the class. What would happen out of this conversation is that as students nod their head, I might encourage them to also speak up and express their views rather than to sit there docile and have someone else be the spokes person. In response to her concerns about fairness, I would explain that society has expectations of schools, which are basically responsibilities. And that I want to fill that expectation that society has of me. And then I would acknowledge that as rather unfair, that adults always be the ones to set the rules, but then I would, in a discussion about what rules to have in the class, meet them half way.

Table 6 Summary of Problems and Solutions for Class Rules (con t.)

Problem (& Constraints)	Solution	Sub	Framing	Action
Raises hand and makes statement	Discuss purpose of rules & democracy Ask for suggestions, state expectations, & compromise to fit needs of class	E3	this is not a normal context. This is (a city). Not a normal context of education I would say. We're talking about professors' kids, and her father's a professor in public health. And her mother is a teacher somewhere else. And so we're talking about some privileged kids who know how to do these things. We're talking kids that put things into a different context than what other kids would do. Other kids thought it was real unfair and everything like that.	What I did was I let them say "What is it that you should do?" we'd list everything that they should do. I had the first whole day talking about what is it that you're going to do. And we talked about a consensus. We talked about living in a democratic society that you come not necessarily to a consensus but to a democratic compromise that everyone has to abide by. we talked about how to make sure that we came to an appropriate set of rules. I presented my expectations for them in light of what I thought that they would want to hear in such a way that it would sound really good to them. Some things didn't work. we went through the process of voting on things they wanted and voting on things that I wanted. There was a stand-off in some instances. My rules were five: Listen, follow directions, respect yourself and others, always do your best. I used the think rule to make sure that they thought about all things. There were a few things like they wanted to have a party every week. So I just introduced another variable and let them know that there were leaders that were chosen. I said "In this classroom, we're going to run it like the State of California. I'm the governor, and you're not. The governor has the right to decide what passes and what doesn't" I did tell them about the override of a veto. they didn't know about that. So I just vetoed everything . what they'd say is "I want to protest." I said, "Please do that. Call your mother and tell her that you won't be coming to school because you are going to be on strike because the teacher decided to do his job."
Raises hand and makes statement	Ask for suggestions, state expectations, & compromise to fit needs of class Discuss structure & purpose of school	E4	--	say "OK, let's make the rules." And I'd ask the students to suggest rules. I'll take what they feel is important for the class to function optimally (and) modify them to some degree and explain why I was modifying them. I'd probably reaffirm what the purpose of the class was. the goal is for them to learn whatever topic we're doing. And at the same time to have a pleasant time and to take something of value from the experience. I would also think that I would probably have to soften some of the rules that they composed.

Table 6 Summary of Problems and Solutions for Class Rules (con t.)

Problem (& Constraints)	Solution	Sub	Framing	Action
Raises hand and makes statement (Age) (Not understanding purpose of rules)	Ask for suggestions, state expectations, & compromise to fit needs of class Discuss structure & purpose of school	E5	many kids don't understand that, or they think that a teacher (is) making up all the rules and give out the homework. I don't think a lot of kids see beyond their school, their principal. They think the principal is the boss and that's it. When I've taught kindergarten, this is their first experience with school and an authoritative figure other than a parent or grandparent.	welcome her suggestions, but make it clear to her and to the class that "Yes, I believe students should have a say in what goes on in the class. However, there are specific requirements that must be met, not only by the students, but by myself as a teacher. I would probably give them a lesson on the whole framework of the educational system. let them see the whole bureaucracy and political structure. once I discuss that, I would ask them to give me their ideas or expectations of themselves. Especially being the first day of class, I would ask them to do that, I would ask them to write down their expectations, their rules. They have to defend their rules, and support their rules. And then we could work towards a common goal, common rules. Especially the first day of class, I let them know that I'm going to push them as hard as possible to get them to attain their highest potential.
Raises hand and makes statement (Age)	Students generate rules respecting individual rights during discussion shaped by teacher Discuss purpose of rules & democracy	N1	So college teaching is entirely different. It is effective at the college level, because that way students will know what they are going to be held accountable for.	I've seen teachers do this the very first day of class, say "These are my expectations of you." And I do that when I teach at the college level. the teacher's not standing up in front of the kids saying "You can't get up and sharpen your pencil while I'm talking. etc. etc." if this is for the elementary school or secondary school, I think it's perfectly OK for the students to make up their own rules. the student's comment that she thinks that students should be allowed to do whatever they want is an interesting one, and would be a great instructional moment. "Do you really think that that would be a good way to structure a classroom, to structure a school, to structure a society? Why do we have rules?" eventually students would agree that rules are important and in order to get anything done, we are going to have to agree about what to do in this classroom and all follow some sort of rules. there's nothing wrong though with the teacher saying "This is what I need from you guys though.

Table 6 Summary of Problems and Solutions for Class Rules (con t.)

Problem (& Constraints)	Solution	Sub	Framing	Action
Raises hand and makes statement (Age)	Shape course to fit needs & interests of students Suggest student find other course	N2	I picture myself in a college classroom.	I'd say "Maybe there are some other classes out there that offer that kind of option, but not this classroom." I may give them the option of writing a paper on the topic of their choice. but in terms of what we do day to day requirements, I'm the one that dictates those rules. I would state that I expect them all to do well, but my job is to arrange the conditions that they are able to do that, to arrange requirements, homework exercises, reading materials that helps them best meet the demands of the course, and hopefully gets them to learn the subject matter. and if they're not comfortable with that situation, then perhaps they should, again, try another classroom, an independent study. So not only would I stress that they could pursue their own interests in the paper, but also that they could try to take the principles and the concepts that I was teaching them and apply it to things that they're interested in. Or encourage them to do that in discussions.
Raises hand and makes statement	Discuss purpose of rules & democracy Ask for suggestions, state expectations, & compromise to fit needs of class	N3	--	allow the students to be in on the rule-making process. I get to be in on it too. the task for the class is to come to a consensus. if they can't come to a consensus, I'll have to enforce them since I'm the authority figure. But, that's kind of an incentive to get them to not sit and fight for the whole period of time. I would state some basic guidelines. "First of all that there's a purpose for school and that there are a certain number of constraints on the situation. we'd talk about what's the purpose of school and why are you here and the laws about school. There are some things that I would want to come out of the discussion. One is that no one can do something that's going to injure another person or that's going to interfere with another person's learning. I would try to have them come up with that, and if they didn't, then I would say "we need to have some kind of guideline like this." I would be really flexible. Ideally, you'd want to anticipate the situation. You'd want to go in the first day with your list of what you want to come out of the discussion, the minimum necessities. If it happened spontaneously, you'd just have to see what came out of the class and see if it was something that I could live with.

Table 6 Summary of Problems and Solutions for Class Rules (con t.)

Problem (& Constraints)	Solution	Sub	Framing	Action
Raises hand and makes statement (Age) (Concern vs defiance) (Competence vs not competent)	Students generate rules respecting individual rights during discussion shaped by teacher Discuss purpose of rules & democracy Discuss structure & purpose of school	N4	if it's an "I just don't want to be here" that's one thing. If it's "there seem to be a lot of silly dos and don'ts that don't have a lot to do with education" that's quite another. There are two things. One is that kids aren't always competent to make certain decisions, and that's a hard point to get across to kids. But that's mostly a problem with younger kids. Frankly, I don't think they would raise these kinds of questions. The "we want to do whatever we want to do" questions that are serious, come from older kids who are, in fact, more competent to make some of these decisions for themselves. If they are competent to make these kinds of decisions, then we have to talk about whether they can or can't make them.	I would get her to explain her situation, what she's saying a little bit more. as far as making some of the rules for the class, I don't have any problem with that. Then again, it's one of those situations where you've got to balance what the students want to do. It's an excellent lead in for a discussion about government and democracy and things like that and what we can and can't do in school. And what is appropriate decision making in the classroom and what things aren't subject to question. We can discuss whether it's a good idea or not but that we're supposed to be (doing it) isn't as much of our choice. If we can agree though that we have to learn biology and math, the way we go about doing that, I think those are appropriate things for a teacher to negotiate with the students about. If students really don't want to learn a particular subject the teacher can say something about why it might be important instead of saying that we just have to do this. If nothing else works, I think we can talk about why some of these things are important.

Table 6 Summary of Problems and Solutions for Class Rules (con t.)

Problem (& Constraints)	Solution	Sub	Framing	Action
Raises hand and makes statement (Concern vs defiance)	Students generate rules respecting individual rights during discussion shaped by teacher Allow freedom within given set of boundaries	N5	The dilemma would be if you felt uncomfortable as a teacher letting students have some control.	I've done this in college courses, just said "I don't have any rules for the class." And I let kids kind of feel me out and I kind of try to interact with them and let them know what the boundaries are. I think it's very important in the first week of class to establish myself as the authority figure in the class. And once I've done that, I can relax and let them have a lot more freedom because they know that when it gets down to it, when I say stop, they have to stop. I try to put as few restraints and boundaries on students' behavior as I could, but there are limits.
			It depends, because if this kid seemed real sassy and real smart, like she was trying to push me a little bit,	in all honesty, I'd probably retort. I'd come back and I'd say "I don't think you're right. I think that students should have a lot of freedom. And I'm willing to give you a heck of a lot of freedom. You'll probably be surprised at how much freedom I'm willing to give you, but I don't think that you're really old enough to understand what the demands of this social situation are." And I'd probably talk to them and say "There are certain things that I have to do and you have to do.
			if she was being sincere and saying "Well, now I just don't like this."	I'd try to allay that fear a little bit. I'd say "OK, let's face it, there are certain rules that we have to abide by. These are the boundaries." I'd make very basic, human rights types of needs. But I wouldn't say "You have to be in your seat. You can't talk unless you raise your hand." They can have input on rules like that. When situations like that come up, we can talk about them. But, I'd say "Let's not deal with rules, because I don't know that they are absolutely necessary. these basic things that we have to do and if we find that we need to make up a rule for something, because we have some problems, we'll do that." But I'd just state three basic rules, like Be responsible for your own behaviors, Don't infringe upon other people's body or property, andLet's all be cooperative and work together and be honest with each other."

Table 7 Summary of Problems and Solutions for Problem Child

Problem (& Constraints)	Solution	Sub	Frame	Action
Trouble Learning Material (Lack of experiential background)	Build on background knowledge/ experiences	E1	If the kid has trouble learning the material, but typically does average work for his grade level, I might assume that the kid has not had experience with the stuff we are studying. If we were doing a unit on plants in the second grade, we did this last year, and there are kids who seem to not really have a concept of parts of plants and how plants work. It turns out that a lot of them live in apartments in the middle of the city where they really don't have access to living growing things. It's not that the concept is impossible or that the learning skills aren't there. It's just something that the kids haven't experienced before.	Bring whatever the experience is into the classroom to the maximum extent possible so the kid would have hands-on experience with it. So if kids haven't grown plants, you grow plants with them.
No Friends (Cannot force friendships)	Find reason for no friends	E1	The kids in your class are not all going to like each other. As a teacher, there are going to be some kids in your class that you don't like. You really want to have an atmosphere where everybody is friends, but you can't guarantee it. You can't mold a little person into the kind of person that will be friends with everybody. If I take ownership of this problem and say "I'm going to take it upon myself to see that this child has more friends"	I'm going to have to sit back and analyzed why is it that the kid doesn't have friends. Is it something about the way he dresses? Is he obnoxious? Is there something that he does or says that keeps him from being friends with people? Is he lacking in the social graces? Does he not know how to get into conversations gracefully? Is he clumsy on the playground so he doesn't get to play a lot? What is it that's preventing him from making friends?
No Friends (Low self-esteem)	Build kid's self-esteem	E1	If it's something that I can't. I couldn't promise that the kid could have a lot of friends, but I could promise to make the maximum effort to see that the child feels good about himself.	The best thing that I could do would be to look for an interest that this child has. Look for a strong point. Look for something the kid is good at, and encourage that in the child. If there is a hobby that the child has, if there is something in school that the kid shines in, give them a way to use that. If they have a lot of knowledge about something, let them share that with the class.
Wears Same Clothes (Unhealthy)	Talk to parents	E1	If it's a health hazard, if the kid sleeps in a bed next to the baby and comes to school with urine on his clothes, that's not a healthy thing for the kid to do.	So while the kid may wear the same clothes more than once a week, I might want to speak with Mom or Dad or whoever the caretaker is and say, "Look, I understand that.he's only got one pair of jeans. And that's fine, but if he's sleeping with the baby, could you make sure that the clothes get rinsed out before he comes to school?" But, I'm certainly not going to insist that the parents buy a wardrobe to suit my specifications.

Table 7 Summary of Problems and Solutions for Problem Child (cont.)

Problem (& Constraints)	Solution	Sub	Frame	Action
Raises Hand (Lack of experiential background)	Spend time working with child individually	E2	So this child really had some difficulties understanding not only what I was trying to teach in terms of aural skills, but also how we were doing this and why. She kept raising her hand and asking me to explain. "I don't understand. What is a perfect fifth?" my response to this situation is certainly constrained by conditions in the classroom and the size of the class.	I tried to spend time with her either working at her desk or have her come up to the front of the room where I was working or move to another part of the classroom where I could try to give an explanation. I could back up and explain more rudimentary concepts. For example, in talking about chord structure and the dominant seventh, explain to her that we have scale structures and try to relate it to math in using the idea of numbers and patterns of numbers in math. Relate them to patterns and scales and chords. Basically, help her to connect on what she know in math.
Child's Self-Esteem	Address self-worth & self-importance issues in class	E2	The issue of isolation, wearing the same clothes every day, is a part of this person's experience. She did see herself as an average student.	My challenge was to help her see that, while she saw herself as average, in some ways she was above average. I tried to address some psychological concerns. Coming back to themes of self-worth and self-importance and the way that we look at ourselves. I did want this young lady to feel that "Yes, we're not all gifted and endowed with genius abilities." We are given certain abilities and, my goal as a teacher is to help develop those and to bring those out.
Get More Information	Use class performance	E2	--	I would use class performance of this student.as a way of helping me quickly understand how well he or she has done in other tasks and see how that is reflected in this particular problem.
Raises Hand	Spend time working with child individually	E4	--	I would respond to him by coming over and staying with him. Rather than explaining it to him again, I'd give him a chance to try and solve it and feel some success. I'd stay with him for a little bit until he was beginning to have some success. And then I'd walk away, and suggest , say if he's doing math, that he complete ten problems. And when he has those completed, raise his hand and I'll come over and we'll look at them together. He's asking for attention, so I'd give him attention, but I'd try to shift how he gets that attention. I'd also work with him in developing autonomy, respond to his discussion or initiations by incorporating what he says in my discourse. And work to build his self-esteem.
Wears Same Clothes (Hard to be around)	Talk to parents	E4	I've had kids that come to school real grubby and their teeth haven't been brushed. Kids avoid them because their gross and hard to be around.	I might have the psychologist or the nurse speak with the family. Possibly myself, depending upon who would be the person that the family would receive the best. Our school nurse often addressed such issues.

Table 7 Summary of Problems and Solutions for Problem Child (cont.)

Problem (& Constraints)	Solution	Sub	Frame	Action
Child's Self-Esteem	Use collaborative groups	E4	--	I would incorporate him into the discussions. Find out if he has any interests, things that he does well, and see if I couldn't support him so that he learns how to work with other kids and other kids learn how to work with him. Collaborative learning groups or puzzle groups is a very good... learning situation for this kid.
Trouble Learning Material	Build on background knowledge/ experiences	E5	--	I would give him some extra material, background material, that would equip him better, build on the background knowledge, his prior knowledge, if in fact he doesn't have that.
Raises Hand (Needs attention)	Spend time working with child individually	E5	He's eager to learn, but he doesn't have enough confidence in himself because he's always claiming he doesn't understand yet he's grade-level average. So he must understand something. It's more of an attention-getting type thing, and he probably doesn't have much self confidence and wants the attention from me to give him more security.	I would work on things that would build his self-esteem, such as giving him extra-credit assignments that I know he could do and know that he understands it. Make him feel good about himself by completing these assignments outside of class.
No Friends	Find reason for no friends	E5	--	If he doesn't have many friends, I would question why. I would probably talk to some of the other children informally and find out what it is about him that they don't like or why they don't want to play with him, children that I know would not be critical and cruel.
Get More Information (Age)	Observe child in cooperative learning groups	E5	There's a few kids in the class, you ask them to do anything and they'll do it for you. They older they are the harder it is.	I would take him aside on his free time, not a noticeable time, and just see what's going on inside of him, at home, everything about him. I would probably send him to work with cooperative learning groups. I would like to see him working with different types of students and observe which students he works with best. I would pull a few kids aside and ask them to have some patience with him and really make an attempt, not to be friends with him, but to work with him as a classmate and not to ostracize him or leave him out in the cold. And through those activities, I would be able to observe why he's not getting along with children or why he doesn't have many friends or why he feels his esteem is down that he doesn't understand the material.

Table 7 Summary of Problems and Solutions for Problem Child (cont.)

Problem (& Constraints)	Solution	Sub	Frame	Action
Trouble Learning Material (Knowledge of student ability)	Adapt material	N1	If it's the beginning of the year, I might not know this immediately, but if it is fairly well into the year, I probably have a much more of a handle on it. If I had knowledge of the child I would know where his particular strengths and weaknesses lie. Then perhaps I could predict why he's having difficulty with this type of material.	I can adapt the material to his unique means as a learner.
Trouble Learning Material (Adequate instruction for individual needs)	Cooperative learning groups	N2	Hopefully, with some extra help from the students in the class he'll be able to catch up. My own philosophy of learning is if you work very hard and you're motivated, that you usually will do pretty well. So, he probably doesn't have the same kind of background or have reached the same achievement levels of other students in the class and needs to do some catching up.	I would have them break up into groups, and have one of the more advanced students work with this child, having her explain to him concepts, giving the help he needs.
Raises Hand	Talk to child outside of class	N2	--	I would say to that child "Why don't you wait until after class and I'll try to explain that to you."
Trouble Learning Material (Comprehends material	Respond to questions in class	N3	He might just be having trouble with the material that's being covered and you don't want to infer too much from what the kid looks like or what the kid does with the other kids. I would try not to take an inordinate amount of time to talk to just this one kid because you'd lose control of the rest of the class. You have to watch all of the kids at once.	I wouldn't necessarily do anything different in the class. I'd allow him to ask questions with the other kids asking questions. And I'd give reasonable length answers. So give him some answers, and this is a kid that I probably would pull aside later on and talk to him, and not confront him with things like "Are you lonesome? Are you having trouble with the other kids?" But just talk to him and try to get a sense of if there's any kind of troubles that he's having that he wants to tell me about. And I'd probably want to talk to his parents if I could.
Child's Self-Esteem (Material vs need for attention)	Consult outside resources	N3	It would depend on whether it was just a problem with the material or whether it was that he wasn't getting some kind of attention, that there was some kind of a problem at home.	In some of those situations, you'd want to talk to a school psychologist, get some outside resources and help for him. Or you might see if he wanted to come in a little bit after class during recess or something and get some extra help.
Child's Self-Esteem (Material vs need for attention)	Talk to child outside of class	N3	It would depend on whether it was just a problem with the material or whether it was that he wasn't getting some kind of attention, that there was some kind of a problem at home.	In some of those situations, you'd want to talk to a school psychologist, get some outside resources and help for him. Or you might see if he wanted to come in a little bit after class during recess or something and get some extra help.

Table 7 Summary of Problems and Solutions for Problem Child (cont.)

Problem (& Constraints)	Solution	Sub	Frame	Action
Get More Information (Comprehends material)	Talk to parent/child outside of class	N3	He might just be having trouble with the material that's being covered and you don't want to infer too much from what the kid looks like or what the kid does with the other kids. I would try not to take an inordinate amount of time to talk to just this one kid because you'd lose control of the rest of the class. You have to watch all of the kids at once.	I wouldn't necessarily do anything different in the class. I'd allow him to ask questions with the other kids asking questions. And I'd give reasonable length answers. So give him some answers, and this is a kid that I probably would pull aside later on and talk to him, and not confront him with things like "Are you lonesome? Are you having trouble with the other kids?" But just talk to him and try to get a sense of if there's any kind of troubles that he's having that he wants to tell me about. And I'd probably want to talk to his parents if I could.
Get More Information (Material vs need for attention)	Observe/talk to child	N3	I'd have to think about whether the problem with this kid is that he doesn't understand the material or "the child does not seem to have very many friends in class and often wears the same clothes to school." I might infer that there might be a social problem with the kid, that he needs attention, that he's not getting some kind of support rather than that he's not getting the material. If he's an average learner, unless I'm doing something very strange this week, he's probably not suddenly having trouble with comprehension.	You'd want to think about and observe the kid and watch what he does with the other kids and possibly talk to his parents about whether there is something happening at home, if there's a particular way that he's acting at home, to try to see exactly what it is that the kid needs.
Raises Hand (Comprehends material)	Re-explain concept during class discussion	N4	I think that for everybody that raises their hand and says that they don't understand, there are three or four other people who are thinking similar things.	So the process of restating what you just said in different words or re-explaining it is good. Going over things a couple different times in different ways is fine. It's a better idea to get a conversation going about the points you're making than to just run through a bunch of points and hope that the kids are understanding.
No Friends (Age & material)	Cooperative learning groups	N4	depending on their age and the material	What I might do to help him relate to other kids, even getting little study or discussion groups going.
Child's Self-Esteem (Social status & neglect)	Talk to child outside of class	N4	He often wears the same clothes to school says that the kid is poor or his parents aren't paying much attention to him. I think that having parents that aren't interested is very difficult for poor kids.	It would be important to try to find out what his home situation is like. I would try to get to know him better and where he's coming from.
Get More Information (Shyness)	Observe/talk to child	N4	Particularly if he doesn't have any friends in class, he doesn't get along with kids or he's too shy. And something can be done about that.	This seems to be one of the situations where I might want to get to know the kid better on an individual basis.

Table 7 Summary of Problems and Solutions for Problem Child (cont.)

Problem (& Constraints)	Solution	Sub	Frame	Action
Trouble Learning Material (Adequate instruction for individual needs)	Adapt material	N5	If the instruction is adequate, then it could be that he isn't mentally ready to learn this type of material. And there is not a lot I can do.	I can try to make it more concrete and give him more introductory or more of an overview of the material, but there's not a lot that I could do about it in that case.
Trouble Learning Material (Comprehends material)	Adapt material	N5	What seems to be the problem is that the kid's having trouble learning the material. And it's kind of strange because he typically does average work. So, the problem is that maybe he's not doing the kind of work that you would expect him to do. He's really interested and eager to learn the new material, but he's having trouble with it. So I guess the problem is that he just doesn't comprehend exactly what this new material is.	What I'd do is figure out from the nature of the material the types of information that is trying to be taught to the child, what it is about that new material that is so difficult for him. I'd talk to the kid or try to figure out from the stuff that he's done in the past, what type of learning style he has and how that's not being met by the way I'm presenting the material and try to change the instruction to try to fit his needs.
No Friends (Cannot force friendships)	Cooperative learning groups	N5	I don't know if there's a lot I could do about getting him to the point where he really has friends.	The fact that he doesn't have many friends could be remedied by putting him in situations where he needs to work with other children.
Wears Same Clothes (Hard to be around)	Talk to child/parents	N5	If it's really bad so that it's something that makes him atrocious to be around,	I might say something to him or maybe talk to the parents about that.

Table 8: Frequencies for Framings Concepts on Class Rules Vignette

Group	Age	Background	Purpose of School	Sincerity	Competence
Experienced	3	1	1	0	0
Non-Experienced	3	0	0	2	1

Table 9: Frequencies for Framings of Problem Child

Group	Trouble Learning	Raises Hand	No Friends	Same Clothes	Self Esteem	Get Information
Experience	2	1	2	2	0	1
No Experience	6	0	2	1	3	1

Table 10: Frequencies for Framings of Trouble Learning on Problem Child

Group	Background	Student Ability	Instruction Adequacy	Comprehend Material
Experience	2	0	0	0
No Experience	0	3	2	1

Table 11: Frequencies for Solution Types for Class Rules

Group	Rules & Rights	Purpose of Rules	Suggestions & Compromise	Purpose of School	Shape Course	Find Other Course	Freedom in Bounds
Experienced	1	1	5	4	0	0	0
Non-Experienced	3	3	1	1	1	1	1

Table 12: Conceptual Orientation Summary for Class Rules

Group	Conceptual Theme	Number of Themes	Percent
E			
	ROL	1	3
	MAN	10	33
	CON	1	3
	PED	1	3
	INT	1	3
	EMO	2	7
	VAL	10	33
	SOC	1	3
	MOT	1	3
	ENV	1	3
	PHY	0	0
	SELF	1	3
	TOTAL	30	
N			
	ROL	3	18
	MAN	7	41
	CON	0	0
	PED	1	6
	INT	0	0
	EMO	1	6
	VAL	3	18
	SOC	0	0
	MOT	2	12
	ENV	0	0
	PHY	0	0
	SELF	0	0
	TOTAL	17	

* ROL=Roles, MAN=Management, CON=Content, PED=Pedagogy, INT=Intellect, EMO=Emotional, VAL=Values & Beliefs, SOC=Social Skills, MOT=Motivation, ENV=Environment, PHY=Physical, SELF=Self

Table 13: t-tests for Conceptual Orientation Theme Use

Vignette	Type of Theme	Group	Mean	SD	df	t	p
Class Rules	Single	E	5.8	1.92	8	2.11	0.03
		N	3.4	1.67			
	Multiple	E	2.0	0.71	8	2.75	0.01
		N	0.6	0.89			
Problem Child	Single	E	11.0	2.24	8	3.16	0.01
		N	7.0	1.73			
	Multiple	E	3.2	1.30	8	2.62	0.04
		N	1.8	0.84			
	Connec-tions	E	1.6	0.55	8	2.56	0.02
		N	0.4	0.89			

Table 14: Diagram Summary for Class Rules & Problem Child Complexity

Group	Vignette	Single Concept Themes	Multiple Concept Themes	Connections Between Problems
E	Class Rules	30	8	--
	Problem Child	55	15	8
N	Class Rules	17	3	--
	Problem Child	35	9	2

Table 15: Conceptual Orientations Summary for Problem Child

E ALL	NF	SC	TL	RH	SE	GI	TOT	%
ROL	0	0	0	0	0	0	0	0
MAN	3	1	0	2	1	4	11	16
CON	0	0	1	0	0	0	1	1
PED	1	0	7	4	2	0	14	20
INT	0	0	3	2	1	0	6	9
EMO	4	2	3	6	2	4	21	30
VAL	1	1	0	0	0	0	2	3
SOC	2	0	0	0	0	0	2	3
MOT	0	0	0	1	0	0	1	1
ENV	0	1	4	0	0	0	5	7
PHY	1	2	0	0	0	0	3	4
SELF	0	2	1	0	0	0	3	4
TOT	12	9	19	15	6	8	69	
%	17	13	28	22	9	12		

N ALL	NF	SC	TL	RH	SE	GI	TOT	%
ROL	0	1	1	0	0	0	2	5
MAN	0	0	0	2	0	0	2	5
CON	0	1	1	0	0	0	2	5
PED	0	0	4	2	0	0	6	16
INT	1	3	7	0	0	1	12	32
EMO	2	1	3	1	0	3	10	27
VAL	0	0	0	0	0	0	0	0
SOC	0	0	0	0	0	0	0	0
MOT	0	0	1	0	0	0	1	3
ENV	0	1	1	0	0	0	2	5
PHY	0	0	0	0	0	0	0	0
SELF	0	0	0	0	0	0	0	0
TOT	3	7	18	5	0	4	37	
%	8	19	49	14	0	11		

* ROL=Roles, MAN=Management, CON=Content, PED=Pedagogy, INT=Intellect, EMO=Emotional, VAL=Values & Beliefs, SOC=Social Skills, MOT=Motivation, ENV=Environment, PHY=Physical, SELF=Self, NF=No Friends, SC=Same Clothes, TL=Trouble Learning, RH=Raises Hand, SE=Self Esteem, GI=Get Information, TOT=Total

Table 16: ANOVA for Theme Use on Problem Child

Source	df	SS	MS	F	p
Group	1	8.53	8.53	8.79	0.0038
Theme	11	100.97	9.18	9.46	0.0001
G X T	11	25.67	2.33	2.40	0.0111
Error	96	93.20	0.97		

FIGURES

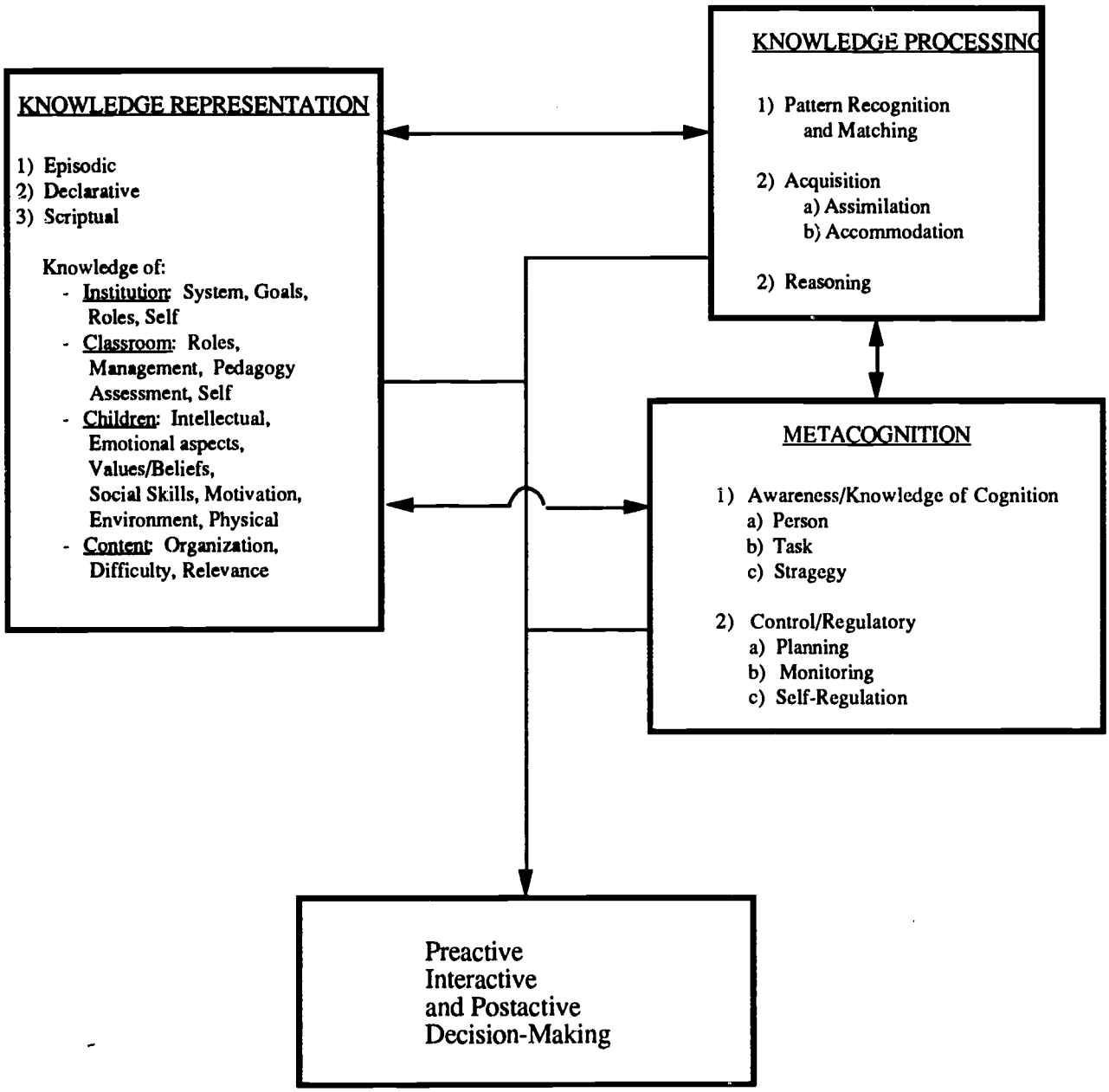
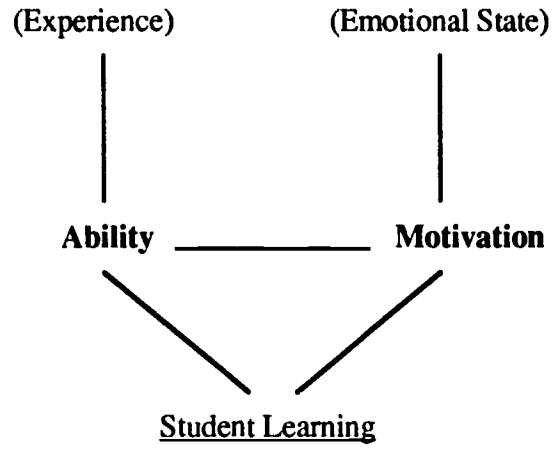


Figure 1: General Cognitive Framework



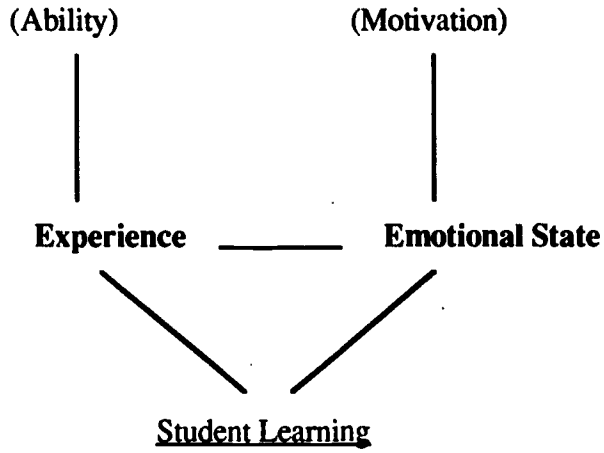


Figure 2: Conceptual Orientation Examples

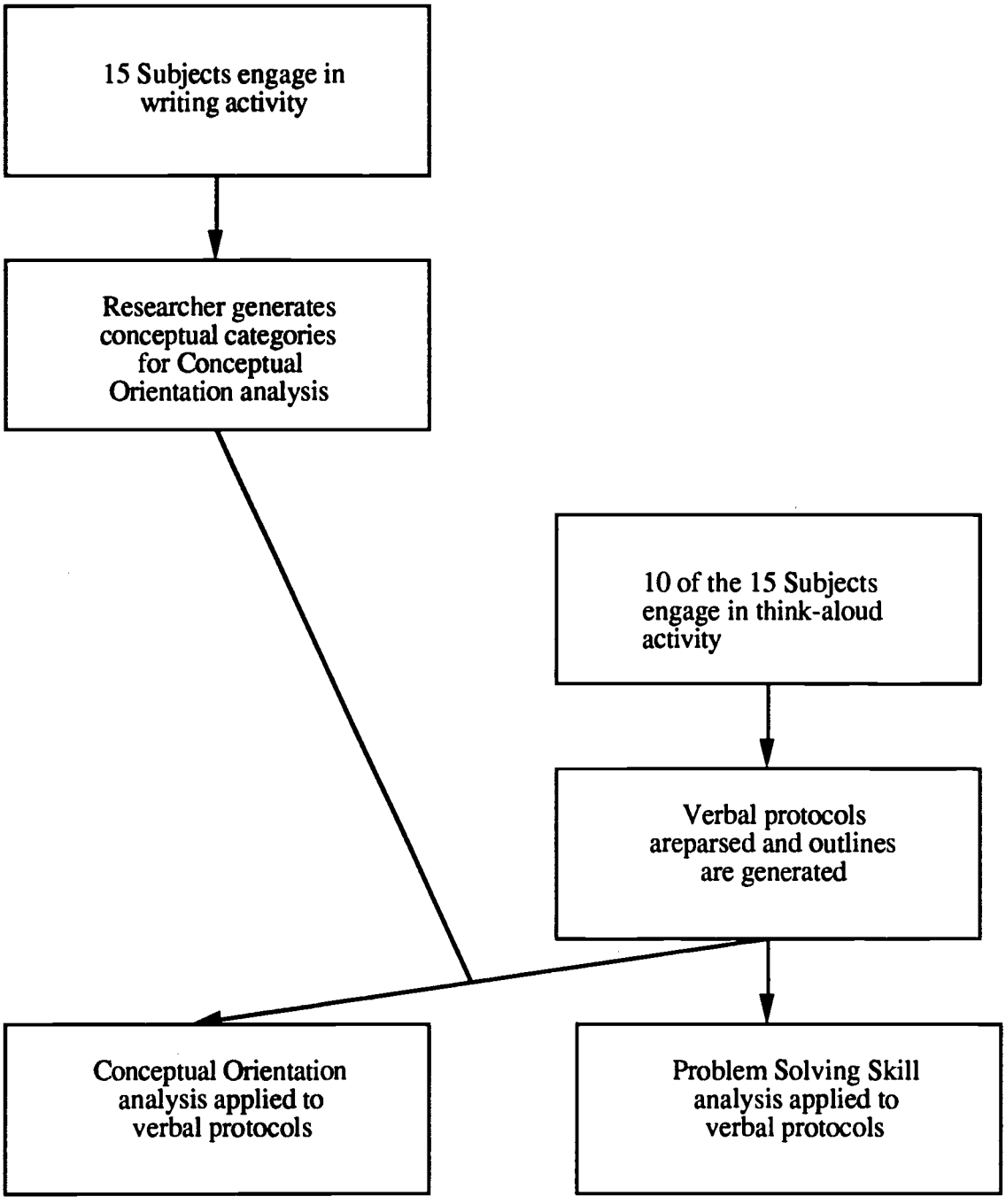


Figure 3: Overview of Data Analyses

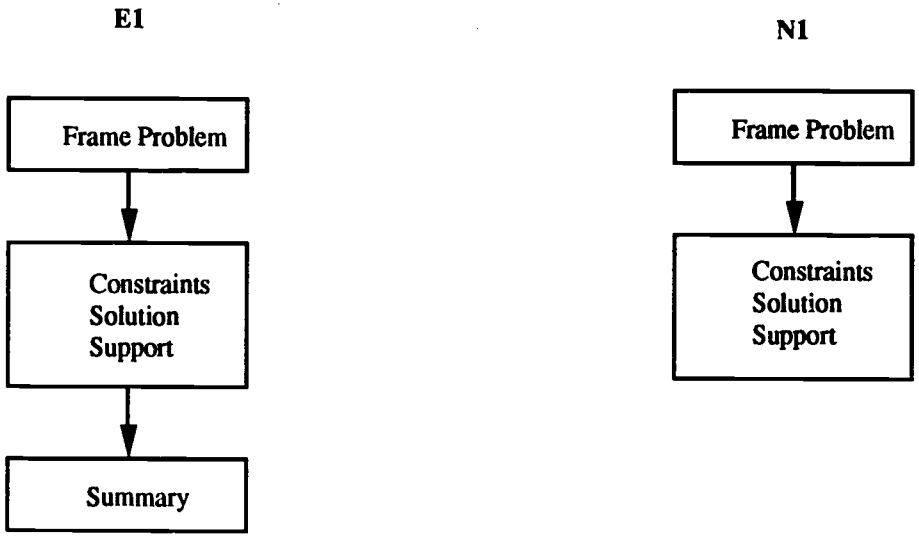


Figure 4: Examples of Problem Solving Approaches for Class Rules

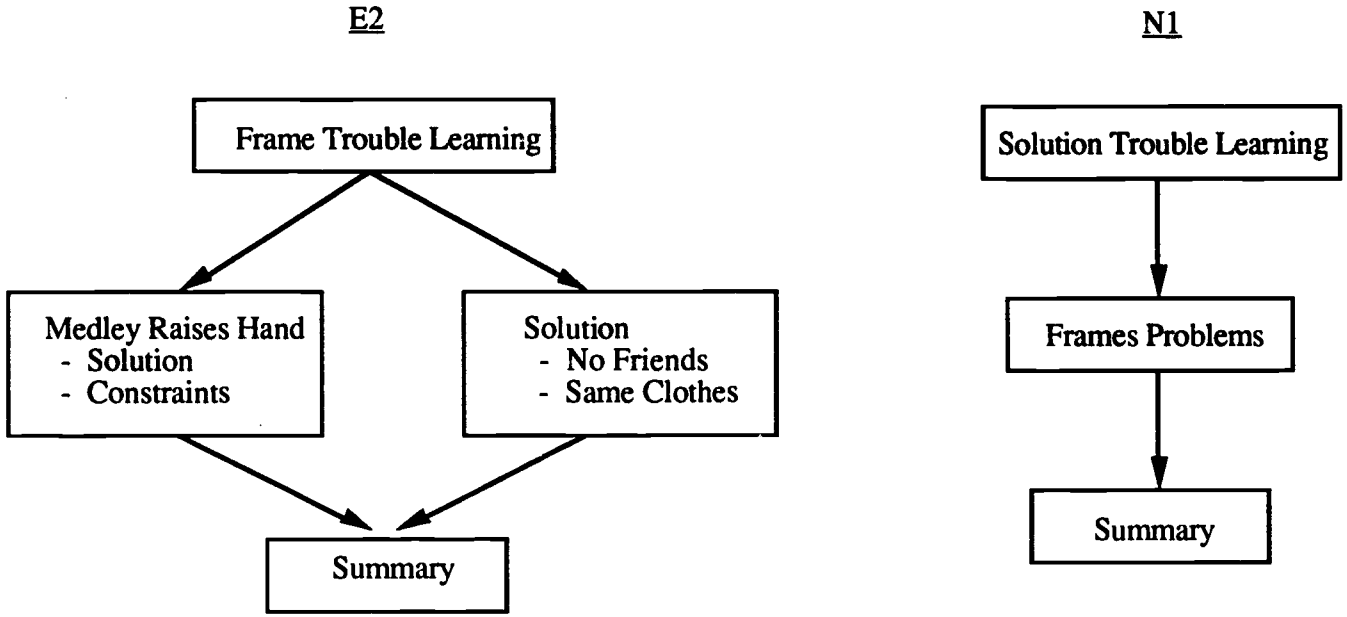


Figure 5: Examples of Problem Solving Approaches for Problem Child

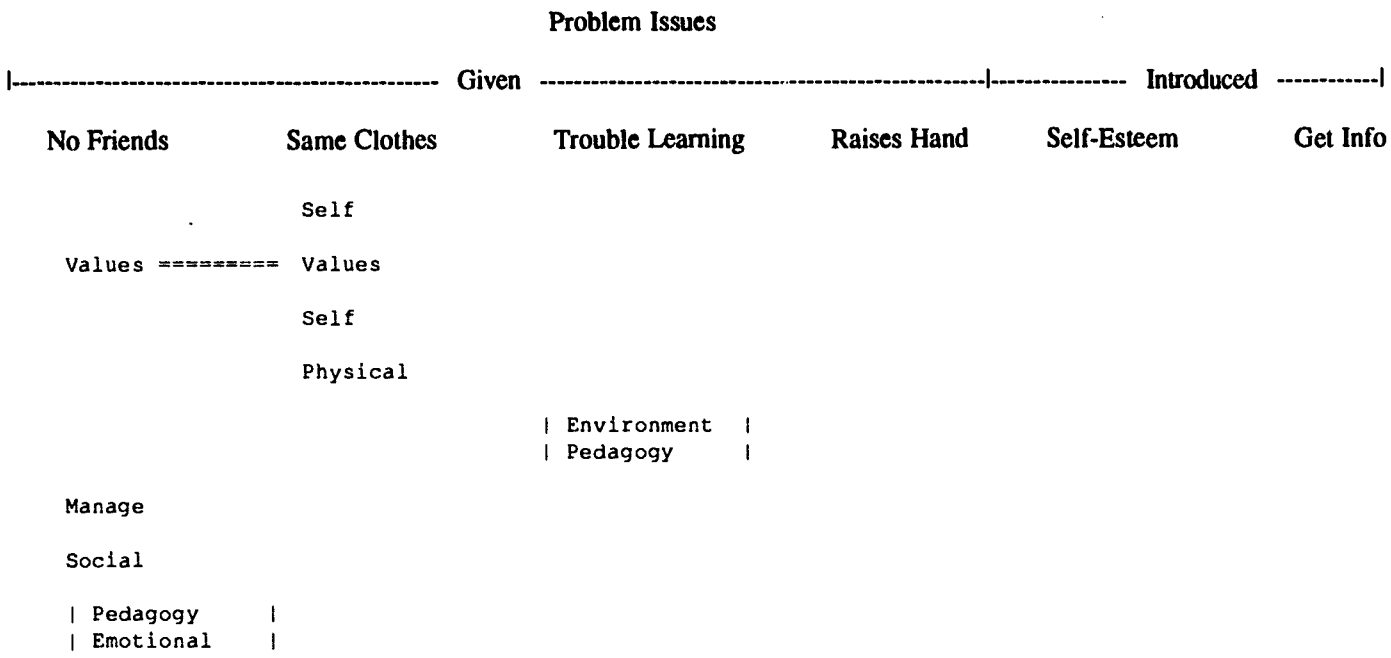


Figure 6: Conceptual Orientations for E1's Problem Child

APPENDICES

Appendix A

PRETEST

INSTRUCTIONS: Read the (*) situation for each SECTION. A set of numbered questions follows the situation. Write your response in the space provided below each question. If you need more space, please write on the back of the page. Provide a brief but thorough response for each question. Please be sure to address all aspects of the question.

SECTION 1:

* Suppose you were hired as a teacher in an alternative high school designed for a special population of students. Most of your pupils have failed in the conventional high school environment

(1) Identify why these students may have failed in the traditional environment. What kind of classroom environment would you adopt for these students? Provide a rationale for why this environment would be desirable (or would be successful) and how it would affect the students.

SECTION 2:

* Your students are reading a short story that is pertinent to the ideas being covered in class. In a large group discussion of the material, you realize that these students display a wide range of understanding of the ideas inherent in the story.

(2) Explain how you would account for these individual differences in further instruction. Set up a real context and give examples.

SECTION 3:

* It is early in the spring semester, and you are asked to take over a class of students for a teacher who has become ill and will miss the remainder of the school year. There are few records of the past achievement of these students, and the teacher has not left any class plans.

(3) Explain what you would do to assess these students and plan instruction, both for short term (e.g., first few weeks) and long term (e.g., semester). Please provide a rationale for your decision-making strategy. Clarify with examples.

SECTION 4:

* During a teacher's conference, a discussion takes place concerning these assumptions about the purpose of education:

A) The primary goal of education is to help students realize their potential.
B) Education should prepare individuals for employment.

(4) How would you relate these assumptions to your views about the goals of education in general? Defend your ideas.

Appendix B

Think Aloud Task

Instructions:

We are studying the manner in which education students think about and solve problems in education. We want to get the best picture we can of how people think about these things, so we are trying to get at that kind of thinking in a number of ways. I want to do two different things today. I'll explain the first one for now and then talk about the other one later.

I am going to give you a set of situations that could occur in a regular classroom or school. I want you to think about the problem and make a decision about what you would do in each situation. Assume that the situation is occurring in a classroom in which you are the teacher. After reading the vignette aloud, I want you to talk constantly. Think, reason in a loud voice, tell everything that passes through your head during your work in arriving at your decision. Don't plan what to say or speak, but rather let your thoughts speak, as though you were really thinking aloud. Take your time at arriving at your decision; this is not a speeded exercise. Do you have any questions?

Just be yourself and speak as naturally as you can. It is important for you to tell me what you think rather than telling me what you think you should say. Please begin by reading this first vignette aloud and then think aloud as you reason through the situation.

Practice Vignette:

You have a student who is always seeking the attention of his fellow students by joking around during class. His classmates think that he is very funny, like him a lot, and frequently laugh at his comments made during class. Today he makes two attention-getting remarks during the first five minutes of the lesson. What would you do in this situation? Describe your thoughts aloud.

Instructions:

OK, that was fine. Do you think you understand what I am asking you to do? ... (Provide feedback if necessary.)

Vignettes:

Roles: On the first day of class, you tell your students that you would like to talk about your expectations of them. Before you begin the discussion, one student raises her hand and states that she thinks that students should be allowed to do whatever they want. She feels that it is unfair for a teacher to tell students what they should and should not do, and that you should let the students make the rules for the class. Other students in the class nod their heads in agreement. What would you do in this situation? Describe your thoughts aloud.

Pedagogy: One child in your class is having particular trouble learning the material that you are presently covering in class. He seems very interested and is extremely eager to learn the new material. As a result, he continually raises his hand and interrupts with interjections like "I don't understand" or "Could you explain that to me again?". You know from his past performance that he typically does average work for his grade level. The child does not seem to have many friends in the class, and he often wears the same clothes to school a couple of days a week. What would you do in this situation? Describe your thoughts aloud

Evaluation: On the last test you administered to your class, one boy wrote "I know this stuff. I don't think that you should give us these stupid tests." You know that the boy participates in class regularly, and when you ask questions he usually gives thoughtful answers. He has a tendency to engage in very analytic discussions about the material that you are presenting. He often gets side-tracked and begins talking about ideas which are only remotely related to the topic of a given lesson. However, he is well-liked by the other students, and seldom causes problems by misbehaving. What would you do in this situation? Describe your thoughts aloud.

Goals: Your school district is being evaluated based upon the results of a state-wide achievement test. You know that all of your children will be tested at the end of this semester, and this information will be used to evaluate your teaching performance. From past experience, the test seems to cover only basic concepts such as factual knowledge and low-level performance skills. On the other hand, your school district has encouraged you to promote higher-order thinking skills by adopting a curriculum appropriate for this goal. What would you do in this situation? Describe your thoughts aloud.

Appendix C

Example of the Analysis Process (from subject N3):

Step 1: Condensed Protocol Divided into Problem Solving Units

I'd have to think ... about whether the problem with this kid is that he doesn't understand the material or whether the problem with the kid is given more by ... "the child does not seem to have very many friends in class and often wears the same clothes to school." ... There might be more of a social problem with the kid, that he needs attention, that he needs adult attention in this case, that he's not getting some kind of support rather than that he's not getting the material. If he's an average ... learner, ... unless I'm doing something very strange this week, he's probably not suddenly having trouble with comprehension.

... So ... you'd want to think about and observe ... the kid and ... watch what he does with the other kids and possibly talk to his parents if the parents are accessible, which is not always the case, about whether there is something happening at home, if there's a particular way that he's acting at home, to try to see exactly what it is that the kid needs. ... He might just be having trouble with the material that's being covered and you don't want to infer too much from what the kid looks like or what the kid does with ... the other kids. ... So I guess I wouldn't necessarily ... do anything different ... in the class. I think I'd ... allow him to ask questions with the other kids asking questions ... and I'd give reasonable length answers. I would try not to take an inordinate amount of time to talk to just this one kid because you'd lose control of the rest of the class. You have to somehow ... watch all of the kids at once. So give him some answers. ... And this is a kid that I probably would pull aside later on and talk to him, and not confront him with things like "Are you lonesome? Are you having trouble with the other kids?" But just ... talk to him. ... and try to get a sense of ... if there's any kind of troubles that he's having that he wants to tell me about. And I'd probably want to talk to his parents if I could.

... It would depend on whether ... it was just a problem with the material or whether it was that he wasn't getting some kind of attention, that there was some kind of a problem at home, ... In some of those situations, you'd want to maybe even talk to a school psychologist, get some outside resources and help for him, or you might see if he wanted to come in a little bit after class during recess or something, and get some extra help. Some kids would like that. And that would be a possible solution as well.

Step 2: Coded Outline

Frames Problems

Having trouble learning material may not be the problem

Could be no friends and same clothes
- Could be indicative of a social problem
- He might need adult attention
- or that he's not getting support
- rather than not understanding material

Unless I'm doing something very strange
- if he is an average learner, he's probably not having trouble with comprehension

* I would observe the kid with other students
* possibly talk to his parents to see if something is happening at home

to see what the kid needs

Solution Trouble Learning

He might be having trouble with the material
so I don't want to infer too much from what the kid looks like or what he does with other kids

* I wouldn't do anything different in class
ex: I'd allow him to ask questions and give reasonable length answers
Try not to take too much time
because I'd lose control of the class
You have to watch all of the kids

* I would also probably pull the kid aside and talk to him
to get a sense of if there are any kinds of problems he's having that he wants to talk about

* I'd talk to the parents if I could

Summary

It would depend on whether it was trouble learning the material

or that he wasn't getting some kind of attention
maybe caused by problems at home

* You might want to talk to the school psychologist
or get outside resources to help him

* See if he wanted to come in after class or during recess for extra help
Some kids would like that

Step 3: Text Embodying Conceptual Categories Excerpted from Protocol

There might be more of a social problem with the kid, that he needs attention, that he needs adult attention in this case, that he's not getting some kind of support rather than that he's not getting the material.

If he's an average ... learner, ... unless I'm doing something very strange this week, he's probably not suddenly having trouble with comprehension.

... So ... you'd want to think about and observe ... the kid and ... watch what he does with the other kids and possibly talk to his parents if the parents are accessible, which is not always the case, about whether there is something happening at home, if there's a particular way that he's acting at home, to try to see exactly what it is that the kid needs.

But just ... talk to him. ... and try to get a sense of ... if there's any kind of troubles that he's having that he wants to tell me about.

... He might just be having trouble with the material that's being covered and you don't want to infer too much from what the kid looks like or what the kid does with ... the other kids.

I would try not to take an inordinate amount of time to talk to just this one kid because you'd lose control of the rest of the class.

... It would depend on whether ... it was just a problem with the material or whether it was that he wasn't getting some kind of attention, that there was some kind of a problem at home,

Step 4: Coded Conceptual Categories

(EMO: Trouble Learning) There might be more of a social problem with the kid, that he needs attention, that he needs adult attention in this case, that he's not getting some kind of support rather than that he's not getting the material.

(PED, INT: Trouble Learning) If he's an average ... learner, ... unless I'm doing something very strange this week, he's probably not suddenly having trouble with comprehension.

(EMO: Get Information) ... So ... you'd want to think about and observe ... the kid and ... watch what he does with the other kids and possibly talk to his parents if the parents are accessible, which is not always the case, about whether there is something happening at home, if there's a particular way that he's acting at home, to try to see exactly what it is that the kid needs.

(EMO: Get Information) But just ... talk to him. ... and try to get a sense of ... if there's any kind of troubles that he's having that he wants to tell me about.

(INT: Trouble Learning) ... He might just be having trouble with the material that's being covered and you don't want to infer too much from what the kid looks like or what the kid does with ... the other kids.

(PED, MAN: Raises Hand) I would try not to take an inordinate amount of time to talk to just this one kid because you'd lose control of the rest of the class.

(INT, EMO: Get Information) ... It would depend on whether ... it was just a problem with the material or whether it was that he wasn't getting some kind of attention, that there was some kind of a problem at home,

Appendix D

Coding for Causal Statements and Examples:

Conceptual Categories for Classroom

Assessment: Ideas or concepts related to the issues of accountability, diagnosis, or evaluation of students in the classroom. These concepts relate to how the teacher uses testing or evaluation in the context of the classroom. How does student assessment influence the teacher and students in the classroom?

Management: Ideas or concepts related to the use of time in the classroom or the establishment of a social/emotional climate for classroom interactions. How do students and teacher feel about the classroom social environment?

> As far as a student (*saying they don't understand*), ... I would be really glad ... because I think it would show me ... that they ... felt comfortable enough with me to say "I don't understand you" Because... it's a reflection on what I'm trying to teach. It's a reflection upon ... how I set up the classroom in such a way so that they feel that they can interact. ... I would ... hope that a student with average work for his grade level would always do that.

> I'd probably reaffirm what the purpose of the class was. What's the goal? And the goal is for them to learn whatever topic or whatever we're doing. And at the same time to have a pleasant time and to take something of value from the experience.

Pedagogy: Ideas or concepts related to how activities are used in the classroom or how the intellectual environment of the classroom and expectations is established. Also has to do with what implications these concepts have to do with student performance. How do classroom activities and the intellectual climate influence the student?

> I ... think that for everybody that raises their hand ... and says that they don't understand there are three or four other people who are thinking similar things.

> Especially the first day of class, I let them know that I'm going to push them as hard as possible to get them to attain their highest potential. In my class at least. And, I always tell them "My expectations are a lot higher than even, what the school wants." And, sometimes I lose kids along the way, but I tend to them separately, but some of those kids really need that push. And they need to know that if this stuff is too easy there is harder stuff for them to be challenged. Because they'll only realize their own potential when they're faced with the challenge. If it's not challenging, they won't, they'll settle for less. I talked with a teacher once who didn't believe that at all, and she said "Well, these kids are dumb, so I'm giving them easy work." And, I don't believe any kid is dumb. There's different expectations for each kid, and there's different levels of potential for each child, but try and reach that.

Roles: Ideas or concepts related to what students and teacher should be doing in the classroom. What are the responsibilities of students and teacher?

> I think that ... it is a positive sign... that he does know when he's confused or doesn't understand, and he has the good sense to let me know that. And it's my job as a teacher to deal with that then.

> So the task for the class is to come to a consensus. And if they can't come to a consensus. I'll have to enforce them since I'm kind of the authority figure. But, that's kind of an incentive to get them to not sit and fight for the whole period of time.

Knowledge of Self: Ideas or concepts related to the individual teacher's ability, self-esteem, motivation, experience, values, or preferences. These concepts relate to how the teacher views him/her self in relation to the context of the classroom.

> Often he wears the same clothes to school a couple of days a week could be a teacher's problem if the teacher is prejudice against people who wear clothes more than once a week.
>
> It happened to me as a student, so I imagine that other students have similar kinds of experiences.

Conceptual Categories for Children

Emotional: Ideas or concepts related to how a student's self-esteem or feelings of security are related to classroom performance and behaviors. These concepts are often related to the seeking of attention, feelings of self-worth, or self-confidence. How does a child's emotional state affect their behavior?

> So he doesn't have the response like " ... Could you explain that to me again." That seems more like and attention-getting.
>
> if she was being sincere and saying "Well, now I just don't like this." There's something wrong, because what has probably happened is sometime in the past, she's had a teacher who was real authoritarian. And really put a lot of restraints on what the students could do.

Environment: Ideas or concepts related to a student's experiential background, family, community, ethnicity, or religion. How does a child's culture affect their behavior?

> And if he's wearing the same clothes to school a couple of days a week, something tells me that he may be coming from a poverty background.
>
> First of all, this is not a normal context. This is CITY. Not a normal context of education I would say. We're talking about professors' kids, and her father's a professor in public health. And her mother is a teacher somewhere else. And so we're talking about some privileged kids who know how to do these things. We're talking kids that put things into a different context than what other kids would do.

Intellectual: Ideas or concepts related to how a student's intellectual ability relates to classroom performance. How does a student's intellect affect their behavior?

> He might just be having trouble with the material that's being covered and you don't want to infer too much from what the kid looks like or what the kid does with ... the other kids.
>
> I know that I've used this technique successfully and unsuccessfully. It's worked well in high school classes where children are ready and have had some experience in other classroom settings of discussing with their teachers "what do we expect for the school year." So it's compatible with their own experience.

Motivation: Ideas or concepts related to a student's interests or feelings of self-determination and how these concepts relate to student behavior in the classroom. How does a child's motivation, interests, or feeling of control affect their behavior?

> Hopefully, with some extra help from the students in the class he'll be able to catch up. ... My own philosophy of learning is ... if you work very hard and you're motivated that you usually will do pretty well.

I wouldn't want to drive them all away, both because that looks bad in terms of keeping my job and secondly because I think that they would enjoy the course the way that I've arranged it.

Physical: Ideas or concepts related to safety or health issues concerning the child. How does a child's physical well-being affect their behavior?

Often he wears the same clothes to school a couple of days a week ... could be a health problem if the kid wears things that are not clean. ... If it's a health hazard, ... if the kid sleeps in a bed next to say the baby ... and comes to school with urine on his clothes, ... that's not a healthy thing for the kid to do.

Social Skills: Ideas or concepts related to a student's social skills. How does a child's social skills affect their behavior?

If he doesn't have many friends, I would question why. ... his social skills and his social habits. ... Also I would probably talk to some of the other children informally and find out what it is about him that they don't like or why they don't want to play with him.

If we're looking at high school students, they're going to be old enough to understand the teacher's side of it as well. They're going to be old enough to understand the notion of power and authority because they've been alive for long enough that they've been dealing with adults in authority positions for a long time.

Values/Beliefs: Ideas or concepts related to a student's values or beliefs. How does a child's values their behavior?

(*Wearing the same clothes*) could be tied to the business of the child not having any friends in the classroom. Kids are very status conscious and (if) somebody wears the same clothes twice ... kids pick up on that. ... I had kids in class who ... were on food stamps, but they wore Reboks because it was a status symbol, something ... that was important to them. So it could be that this business about wearing the same clothes to school a couple of days a week could be related to not having many friends in the class.

But, I do think that rules imposed from above are not as valued by the students as perhaps rules that students agree on for themselves. A lot of kids, don't understand why they can't chew gum.

Conceptual Category for Content

Content: Ideas or concepts related to the difficulty of the content or the relevance of the content for the students. How do students feel about the material that they are learning?

... And (*my solution to the problem*) ... would depend on what kind of material I was covering, if it was math or ... reading or whatever.

I think that that's important because, in a school year, I would want to set a tone and an expectation that while I have some preconceived views about a curriculum and a course of study, I certainly welcome students' opinions about that course of study and also to let them know that while they can express their views, chances are that I'm going to have some direct and compelling reasons to offer the kind of curriculum that will be taught in the classroom, particularly if it's music.

CODING PROCESS FOR STATEMENTS

1. Identify all statements or series of statements that indicate a causal relationship between some concept and either the student's behavior, the existence of a problem for the student, or the existence of a classroom problem or situation that influences the children's behaviors. If more than one conceptual category is associated with a set of statements, then the statement receives a multiple coding. The types of statements that fall into these categories are outlined below:

   a. "If ..., then ...": statements that suggest that if a student is behaving in a specific manner, then there is some cause for this behavior. These types of statements do not include statements concerning what a teacher would do. (e.g., If the student is doing that, then I would do this."
   b. "The reason for .... is ...": statements that indicate the reason for some student behavior or classroom condition. These types of statements may include reasons that a teacher would take an action. (e.g., I would do this because it would have this affect.)
   c. " ... because ...": these statements are essentially the same as the previous but are stated in a different format.
   d. Statements of fact about children: statements that indicate specific attributes of children or that children behave in specific ways.
   e. Statements of counterfact about children: statements that indicate the non-existence of a cause. (e.g., "It is not caused by ...")

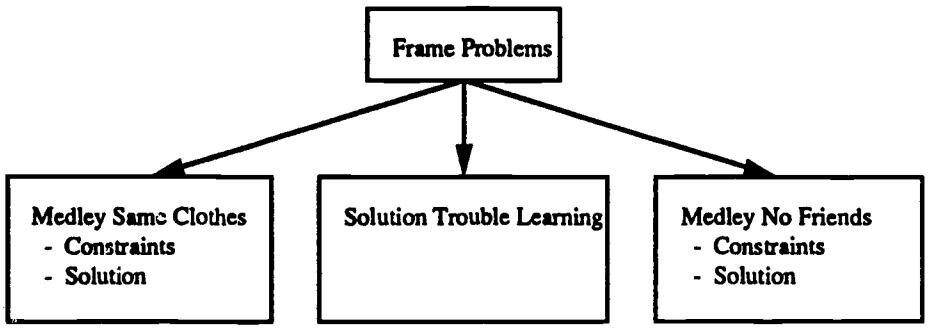
2. Identify the problem or problems associated with each statement.

3. Use the codings from #1 & #2 to show all relationships between problems and statements. (Note the problems of Get More Information and Non-Specific will not be included because they do not imply causal relationships).

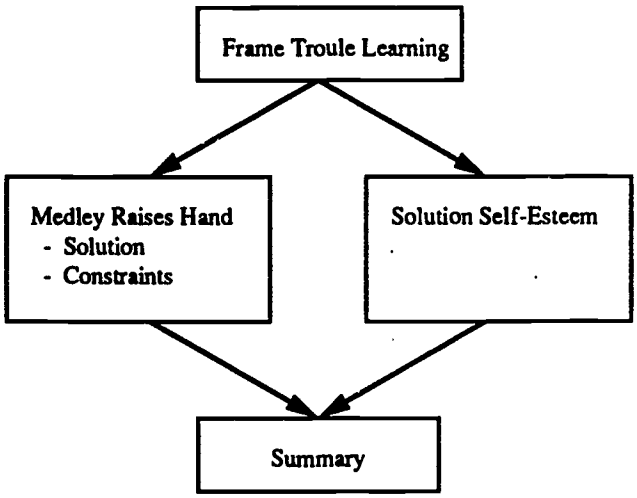
Appendix E

Diagrams of Problem Solving Activities

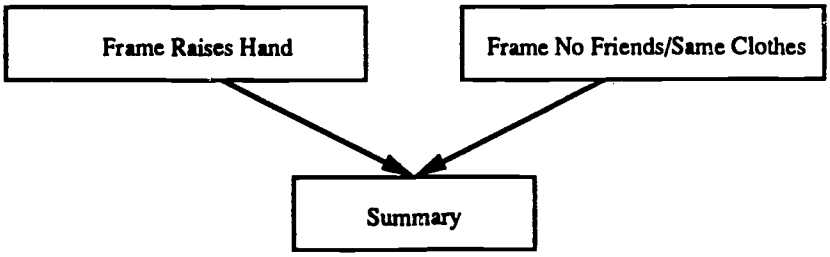
E1


Frame Problems
Medley Same Clothes
- Constraints
- Solution
Solution Trouble Learning
Medley No Friends
- Constraints
- Solution

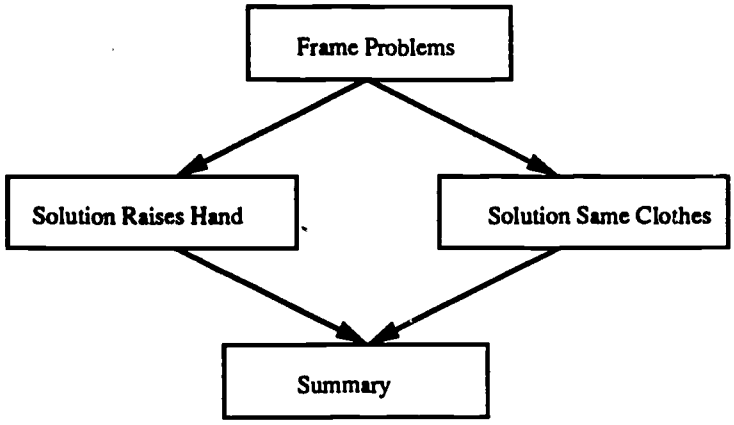
E2


Frame Troule Learning
Medley Raises Hand
- Solution
- Constraints
Solution Self-Esteem
Summary

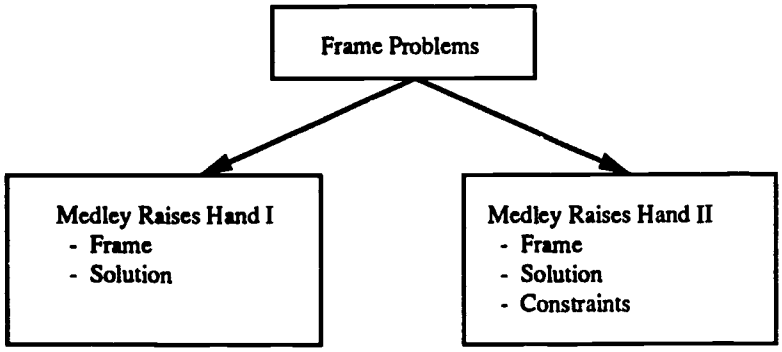
E3


Frame Raises Hand
Frame No Friends/Same Clothes
Summary

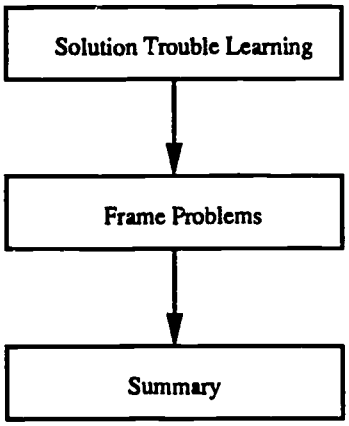
E4


Frame Problems
Solution Raises Hand
Solution Same Clothes
Summary

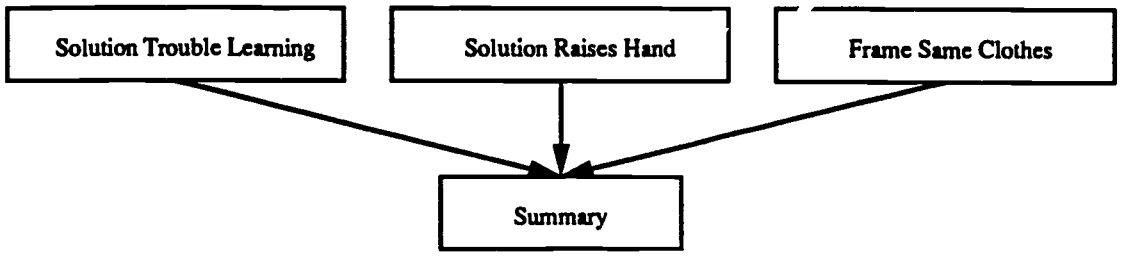
E5:


Frame Problems
Medley Raises Hand I
- Frame
- Solution
Medley Raises Hand II
- Frame
- Solution
- Constraints

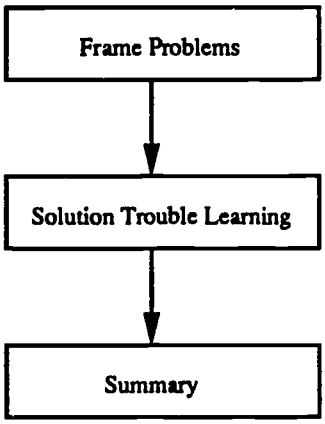
N1


Solution Trouble Learning
Frame Problems
Summary

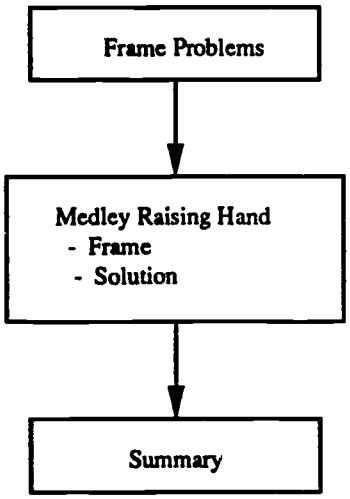
N2


Solution Trouble Learning
Solution Raises Hand
Frame Same Clothes
Summary

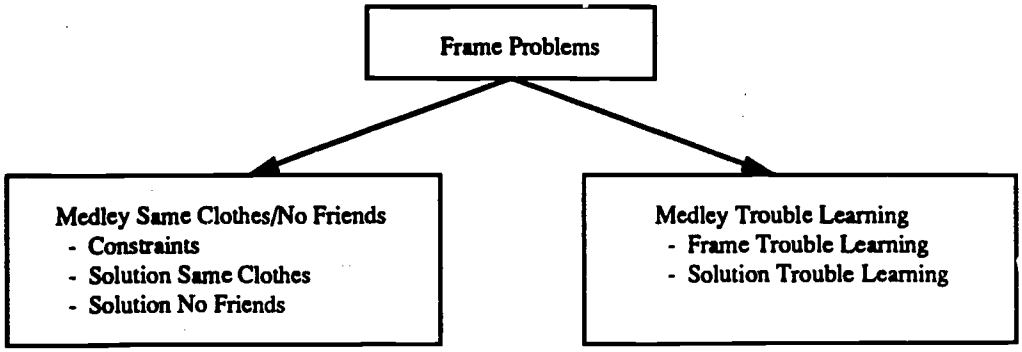
N3


Frame Problems
Solution Trouble Learning
Summary

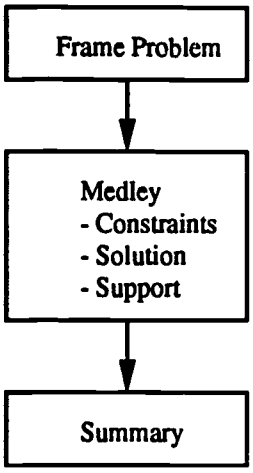
N4


Frame Problems
Medley Raising Hand
- Frame
- Solution
Summary

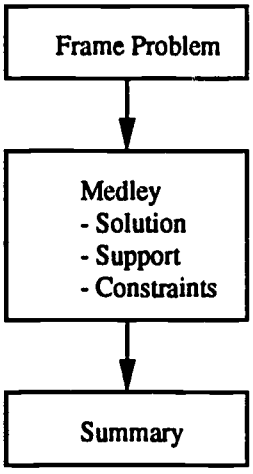
N5:


Frame Problems
Medley Same Clothes/No Friends
- Constraints
- Solution Same Clothes
- Solution No Friends
Medley Trouble Learning
- Frame Trouble Learning
- Solution Trouble Learning

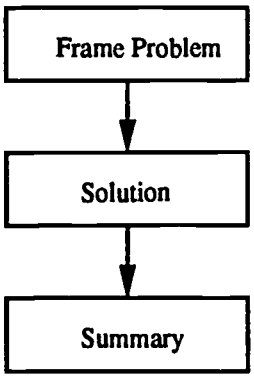
E1:


Frame Problem
Medley
- Constraints
- Solution
- Support
Summary

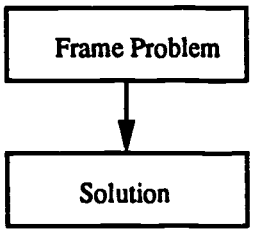
E2


Frame Problem
Medley
- Solution
- Support
- Constraints
Summary

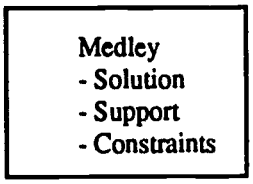
E3


Frame Problem
Solution
Summary

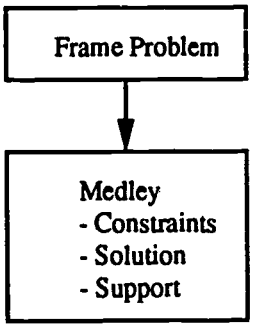
E4


Frame Problem
Solution

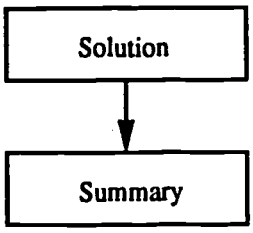
E5


Medley
- Solution
- Support
- Constraints

N1

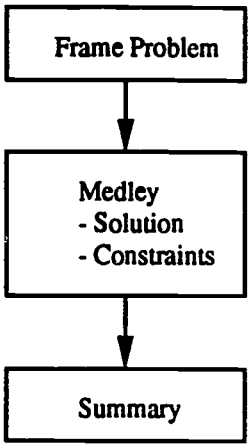

Frame Problem
Medley
- Constraints
- Solution
- Support

N2

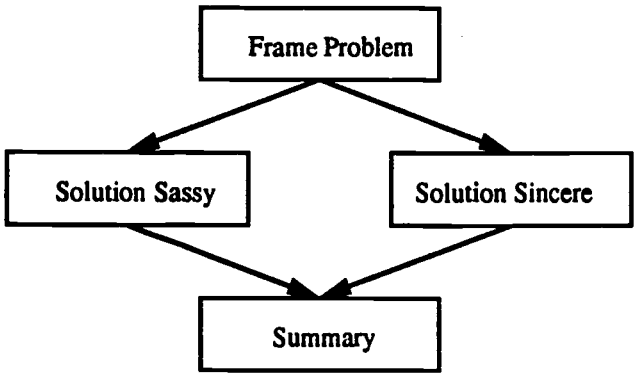

Solution
Summary

N3

N4



N5: Roles



Appendix F

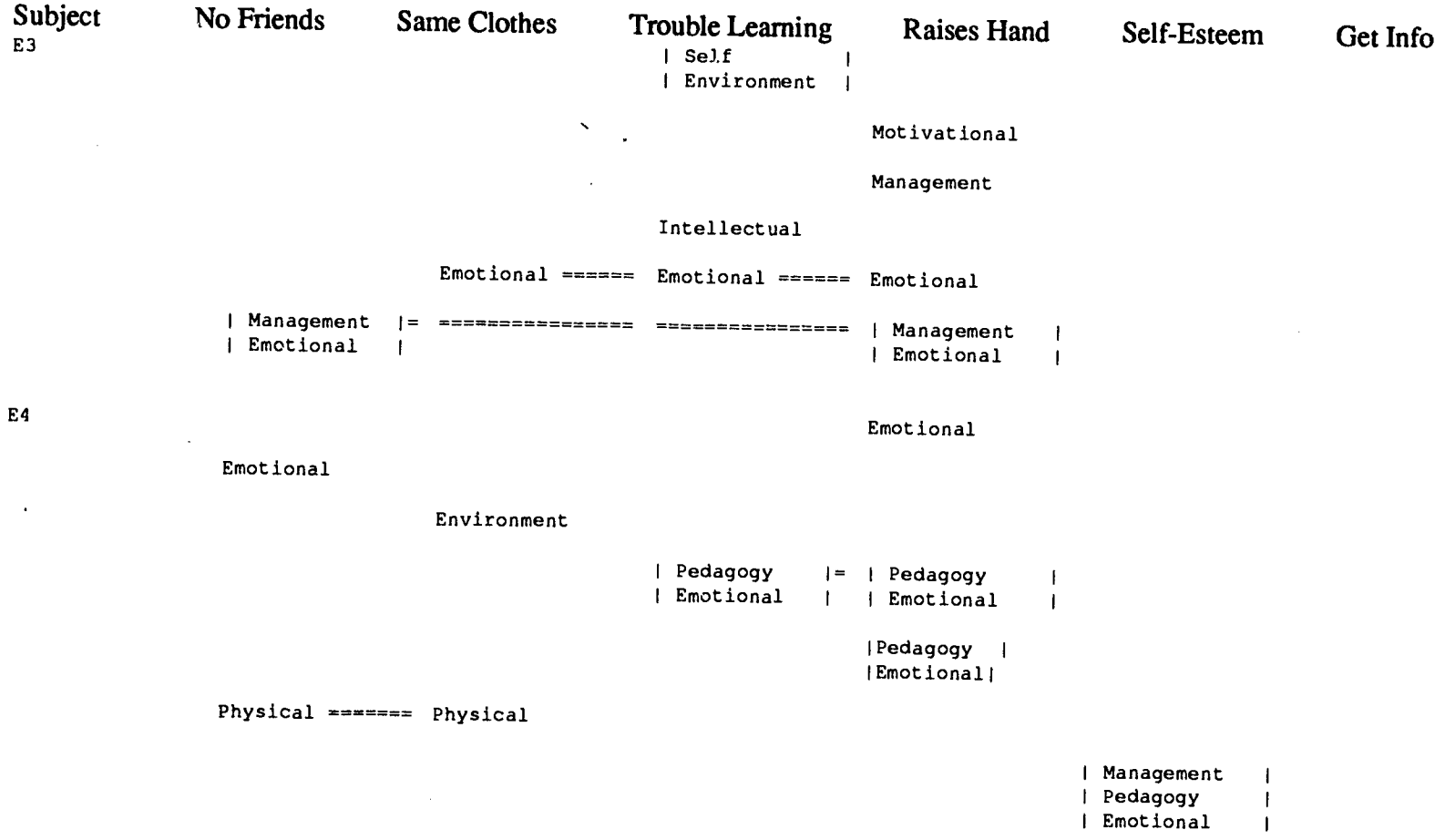
Diagrams of Conceptual Orientations

Subject	Codes
E1	Management Values Emotional Social Management Management | Values | | Motivation |
E2	Emotional | Values | | Self | Content Management Management | Intellectual | | Values |
E3	Environment Values | Values | | Management | Management
E4	Management | Roles | | Values |
E5	| Values | | Management | | Values | | Pedagogy | | Values | | Management |
N1	Management Values
N2	Motivation | Management | | Roles |

Subject	Codes
N3	Management
	Roles
N4	Values
	| Management |
	| Values |
	| Management |
	| Pedagogy |
	| Motivation |
N5	Management
	Management
	Roles
	Emotional

Problem Child Diagrams

Subject	No Friends	Same Clothes	Trouble Learning	Raises Hand	Self-Esteem	Get Info
E1		Self				
	Values =========	Values				
		Self				
		Physical				
			| Environment |			
			| Pedagogy |			
	Manage					
	Social					
	| Pedagogy |						
	| Emotional |						
E2			| Environment |			
			| Pedagogy |			
			| Content |			
			| Environment |			
			| Pedagogy |			
			| Intellect |			
			| Pedagogy |			
			Emotional			
			Pedagogy =======	Pedagogy		
	| Management |=	| Management |=	==========	==========	==========	| Management |
	| Emotional |	| Emotional |				| Emotional |
						| Management |
						| Emotional |
				Intellectual		



Problem Child Diagrams

Subject	No Friends	Same Clothes	Trouble Learning	Raises Hand	Self-Esteem	Get Info
E5						|Environment |
						|Emotional |
	Social					
				| Pedagogy |=	| Pedagogy |	
				| Intellectual|	| Intellectual |	
				| Emotional |	| Emotional |	
			| Intellectual |			
			| Pedagogy |			
				Emotional		
						| Management |
						| Emotional |
						Management
N1	Intellect					
		Content				
		Intellect ======	Intellect			
		| Roles |=	| Roles |			
		| Intellect |	| Intellect |			
			Emotional			
		Intellect				
N2			| Pedagogy |			
			| Emotional |			
				Management		
			Motivational			
			| Intellectual |			
			| Environment |			

Problem Child Diagrams

Subject	No Friends	Same Clothes	Trouble Learning	Raises Hand	Self-Esteem	Get Info
N3						Emotional
			| Intellectual |			
			| Pedagogy |			
						Emotional
			Intellectual			
				| Pedagogy |		
				| Management |		
						Emotional
						| Emotional |
						| Intellectual |
N4	Emotional					
	Emotional					
		| Emotional |				
		| Environment |				
				Pedagogy		
				Emotional		
N5			| Intellectual |			
			| Content |			
			Emotional			
			Pedagogy			
			| Intellectual |			
			| Pedagogy |			

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