DOCUMENT RESUME

ED 224 793 SP 021 548

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TITLE Classroom Processes Observer Manual.
INSTITUTION Wisconsin Center for Education Research, Madison.
SPONS AGENCY National Inst. of Education (ED), Washington, DC.; National Science Foundation, Washington, D.C.; Wisconsin Univ., Madison. Graduate School.
PUB DATE 81
GRANT NIE-G-79-011; NIE-G-81-0009; SED78-17330
NOTE 79p.
PUB TYPE Guides - Non-Classroom Use (055) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Classroom Communication; Classroom Environment; *Classroom Observation Techniques; *Classroom Research; Elementary Secondary Education; Interaction Process Analysis; Mathematics Instruction; Observation; *Student Behavior; *Student Teacher Relationship; Teacher Behavior; *Time on Task

ABSTRACT

This manual describes procedures for collecting data about two classroom elements: (1) teacher-student interactions; and (2) amount and type of student engagement in academic work. Although the system was originally developed from a study of influences on sex-related differences in mathematics, it is designed to be adapted as needed for investigations of other classroom behaviors. Part 1 of the manual contains explanations of the use of a modified version of a coding system developed by Brophy and Good (1970) to measure teacher-student interactions. These interactions are classified as public and nonpublic, and examples of measuring the incidence and qualities of behaviors are given. In a section reviewing general coding conventions, the validity of the procedure is interpreted, and observation techniques are suggested. In Part 2, the method used to study the proportion of time students are engaged in mathematical activities, and characteristics of those activities are introduced, based on a system designed by Romberg, Small, Carnahan, and Cookson (1978). Coding categories and data collection procedures are defined. Data collection worksheets are appended. (FG)

CLASSROOM PROCESSES

OBSERVER MANUAL

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1981

Developed under grants from the National Science Foundation (Grant No. SED78-17330), University of Wisconsin--Madison Graduate School, and the National Institute of Education (Grant No. NIE-G-79-011). Final work was supported by the National Institute of Education under Grant No. NIE-G-81-0009 to the Wisconsin Center for Education Research. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the Institute or the Department of Education.

ACKNOWLEDGEMENTS

Many people have contributed to both the development of the ideas expressed in the manual, the conceptual structure of the observational method, the methodological considerations of data collection and the readability. Special acknowledgement is given to Jere Brophy and Thomas Good for their pioneering efforts in this type of research. Thomas Romberg, Marian Small, Richard Carnahan and Connie Cookson contributed ideas for the time sampling procedures. Penelope Peterson, throughout the development of the manual contributed her quiet wisdom in improving the entire procedures.

Special thanks are given to Mary Schatz Koehler, Joan Daniels Pedro and Harriett Sackett for their patient and insightful help.

The work could not have been done without all the observers who collected data and teachers who welcomed us into their classrooms.

OVERVIEW

This manual describes procedures for collecting data about two important classroom processes: 1) teacher-student interactions and 2) amount and type of student engagement in academic work. While specific observation categories are defined in the manual, the system has been designed to allow many categories of behavior to be observed. Thus, while the manual is quite explicit in describing specific categories of teacher-student interactions and task engagement, a researcher planning to collect information about classroom processes would need first to decide what specific categories of behavior she/he was particularly interested in and then use the system to train observers and collect data. It is possible to use all or part of the categories described. However, the strength of the system lies in the possibility of adaptation or modification of categories as required by new knowledge and scholarly interest.

The categories defined and described within the manual, and the procedures themselves, were developed to assist in the collection of data for a longitudinal study investigating educational influences on the development of sex-related differences in mathematics. The most important educational influences identified by scholarly procedures (literature review and previous research) occur within the mathematics classroom in two areas: teacher-student interactions and engagement with mathematics. Specific categories of interest were then identified and procedures which would enable valid and reliable data to be collected were determined. Because interactions between the teacher and individual student appeared to be important, the Brophy-Good Dyadic Observation scheme was selected

as a model for the interaction observation. Major adaptation of their categories as well as procedures for both training observers and data collection was made.

The proportion of time students are engaged in mathematics learning activities and some of the characteristics of those activities make up the second major portion of classroom processes observed.

Included in this manual are explicit definitions of the categories observed, complete descriptions of the data collection procedures, and observer training procedures.

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PART I

TEACHER-STUDENT INTERACTIONS

This part of the manual presents the coding system used to study teacher-student interactions in classrooms. It is a modification of a coding system developed by Jere E. Brophy and Thomas L. Good (1970) to record classroom interactions between teachers and students. (In fact, portions of this observer's manual were taken directly from the Brophy-Good manual with their permission.) This system focuses on classroom interactions in which the teacher is dealing with a single student.

Particular students in a classroom are selected for observation, and the characteristics of each interaction that occurs between the teacher and one of the selected students (i.e., target students) are recorded. An interaction occurs when: (a) the teacher addresses an individual target student and the student does or does not respond, or (b) an individual target student addresses the teacher and the teacher responds to that individual student. This may be at any time during the period designated for observation. Interactions between the teacher and individual target students are coded regardless of the content or setting of the interaction. Interactions may occur one-to-one with the teacher, in small groups, or in front of the entire class. Interactions may be concerned with student conduct, the subject matter, classroom organization, instructions, assignments, or personal matters.

A special coding sheet, clipboard and guide have been designed to use when recording characteristics of teacher-student interactions.

The coding sheet, a copy of a coding guide and a photograph of the entire apparatus are shown in Appendix Four. Categories selected to be observed are listed on the coding guide and the guide is used to enable observers to code in the correct portion of the coding sheet during observation. Certain blocks on the coding sheet are filled in before observation begins. Observer, Day, Teacher, and Student I.D., and other blocks are filled in during observations. One line in the Student Number, Public-NonPublic block is used for each interaction coded. For any interaction, Student Number is coded by darkening the appropriate circle in the Student Number region. This identifies which student was involved in the interaction. Thus, on a given day each target student has one and only one student number. To indicate characteristics of the interaction, circle(s) are darkened in the Public region or the NonPublic region on the same line with the student number. An interaction is coded in the Public region if it occurs in view of the entire class or a small group and the class or group attends to the interaction. When the attention of the class or group is not on an interaction, the interaction is coded in the NonPublic region.

Public Teacher-Student Interactions

Public interactions occur when the teacher and an individual target student interact and the attention of the class or group is on the interaction. Public interactions are coded by darkening the student number of the target student and the appropriate circles for Student Initiated, Response Opportunity, Level of Question, Student's Answer, and Feedback.

The characteristics of public interactions are recorded in the region to the right of Student Number with one interaction for each line. To some degree the sequence in which decisions are made about the aspects of public interactions is the same as the order in which the categories appear on the coding sheet.

Student-Initiated

Student-Initiated interactions may be Public or Non-Public. When a Public Student-Initiated interaction occurs, it is coded in the Student Initiated-Public column. Such interactions are coded when a target student asks the teacher a question or volunteers a comment to the teacher. The teacher must respond to the question or comment in some way other than criticizing the target student for having asked the question or made the comment. Only if the teacher responds without criticizing the student's initiation behavior, is an interaction coded. Student-Initiated Public interactions are indicated by darkening the circle in the row of the interaction and in the column labeled Student Initiated. If the public interaction is Teacher-Initiated, this circle is not darkened.

Response Opportunities

After the identity of the student has been noted and decisions have been made about whether the interaction is Public or Non-Public and Student-Initiated or Teacher-Initiated, the type of Response Opportunity for a Public interaction is noted by darkening one of the four categories: Discipline, Direct-No volunteer, Open-Volunteer, or Callout. Teacher-initiated public interactions may be coded as any one of the four types

of Response Opportunity. Student-initiated public interactions may be coded as either Open-Volunteer or Callout, but not as Discipline or Direct-no Volunteer. Type of Response Opportunity is coded for each public interaction unless the interaction is the result of Sustaining Feedback. If this is the case Response Opportunity is left blank. (Sustaining Feedback will be discussed in a later section of this manual.)

Discipline*

The Discipline category is a unique type of Response Opportunity in which the teacher uses the question or request as a control technique, calling on the target student to force him/her to pay better attention rather than merely to provide a response opportunity in the usual sense. In coding Discipline, the coder should be convinced that the teacher deliberately called on the student involved because of poor attention or cooperation. Usually this will involve direct evidence in the teacher's subsequent behavior, as when he responds to the student's inability to answer with a statement such as "Maybe if you paid better attention, you'd know the answer." Thus, Discipline should be conservatively coded; the fact that the teacher may ask a direct question of a student who has not been completely attentive in the preceding moments does not by itself constitute enough evidence to code the discipline question. There must be some indication that the teacher has deliberately called on the child to compel his/her attention. Clearly, this type of Response Opportunity must be teacher-initiated. This category is not used to indicate teacher praise or criticism of a target student's classroom behavior.

*This section is taken from the Brophy-Good manual with minor editing.

Direct-No Volunteer*

Except for the special case of discipline questions, all instances in which the teacher calls on a target student who is not seeking a Public interaction are coded as Direct-No Volunteer. Direct-No Volunteer response opportunities are the clearest examples of teacher-initiated public interactions. In contrast to Open-Volunteer and Callouts, in Direct-No Volunteer the student does not raise her/his hand, call out an answer, or otherwise indicate that she/he wants to respond. Instead, the teacher calls on her/him to respond without any indication of interest or willingness on her/his part. Thus, whenever a teacher publicly calls upon a target student who does not have her/his hand up, it is coded as Direct-No Volunteer. This includes instances in which the teacher calls on a target student before he has a chance to raise his hand (as when the teacher names the student before asking the question) as well as instances in which the teacher calls on a child who does not have her/his hand up rather than on one who does. A student-initiated public interaction should never be coded Direct-No Volunteer.

Open-Volunteer*

In the Open-Volunteer response opportunity, both the teacher and the student are involved in determining who interacts. Here the teacher asks a question or makes a request, waits for the students to raise their hands and then calls on one of the students who has her/his hand up. The teacher creates the response opportunity by asking a public question or making a request, and also indicates who is to respond by

*This section is taken from the Brophy-Good manual with minor editing.

calling on an individual student, but he chooses one of the students who has indicated a desire to respond by raising her/his hand. In the Student-Initiated case the target student raises his/her hand to address the teacher and the teacher gives permission for the student to speak. In summary, Open-Volunteer is coded: (a) when a target student volunteers to answer a teacher question and is called on to respond by the teacher, or (b) when a target student raises his/her hand, is called on, and then asks a question, or makes a comment to which the teacher responds.

Occasionally, there will be difficulty distinguishing between Direct-No Volunteer and Open-Volunteer. This occurs when the teacher poses a question and waits for students to raise their hands, but calls on a target student whom the coder has not been watching. The coder must quickly check to see if the target student had his/her hand up or not. If the teacher has called on a target student with his/her hand up, the response opportunity should be coded as Open-Volunteer; if he has called on a target student who did not have his/her hand up, it should be coded as Direct-No Volunteer. Whenever the coder is not sure whether or not the target student had his/her hand raised, the response opportunity should be coded as Open-Volunteer. This means that the category Direct-No Volunteer will be kept restricted to those instances in which coders are certain that the teacher called on a target student who did not seek out an opportunity to respond. The category Open-Volunteer will then include both instances in which the coder is certain that the teacher called on a target student who raised his/her hand and instances in which the coder is not certain whether or not the target student raised his/her hand.

Callouts*

A Callout is coded when a target student calls out a question or an answer without waiting for permission from the teacher. In a Teacher-Initiated Callout, the teacher presents a task to which students are to respond, and an individual target student calls out an answer before the teacher has a chance to indicate that a particular student should respond. In a Student-Initiated Callout, an individual target student calls out a question or comment without waiting for teacher permission to talk. One additional consideration must be present before observers code Callout under Response Opportunity. The teacher must acknowledge the target student's response or question. A called out answer or question from a target student which is ignored by the teacher is not considered to be an interaction, and as such, is not coded. A Response Opportunity which is coded Callout then, is a public interaction in which an individual target student speaks without first receiving permission and the teacher turns his/her attention to the student and says something in response. The interaction is not coded as a Callout if the only teacher response to the student is criticism for having called out. In a Callout the teacher must make some response to the student other than criticism of the callout behavior.

Just as there may be confusion in distinguishing between Direct-No Volunteer and Open-Volunteer when the coder is unsure whether or not the target student has raised his/her hand, there may also be confusion in distinguishing between Open-Volunteer and Callout if the coder is

*This section is taken from the Brophy-Good manual with minor editing.

unsure whether or not the teacher made some indication to the target student that he/she should speak. There is usually little problem when the teacher calls on the children by name, but some teachers will call on children by pointing at them or otherwise non-verbally indicating that they should make a response. Coders should be particularly alert with such a teacher to pick up these less obvious cues given to children to signal their permission to respond. When the coder is not sure whether or not the teacher made such a signal, and therefore is not sure whether or not to code Open-Volunteer or Callout, the interaction should be coded as a Callout.

The decision rules in handling ambiguous situations regarding coding of the type of Response Opportunity may be summarized as follows: (a) indecision between Discipline and Direct-No Volunteer is resolved by coding Direct-No Volunteer; (b) indecision between Open-Volunteer and Callout is resolved by coding Callout. The Discipline category implies that the teacher deliberately calls on a target student because he has seen that the student is not paying attention and wishes to compel his/her attention; the Direct-No Volunteer implies less than this, only that the teacher deliberately interacts publicly with a specific student; the Open-Volunteer category implies deliberate interaction with a specific child, but this decision is affected by the fact that the student is one of those with his/her hand up seeking an opportunity to speak; the Callout implies nothing about the teacher's decision to have a student interact since the target student calls out an answer before the teacher has a chance to provide a public interaction opportunity.

By following the decision rules for handling the ambiguous situations outlined above, coders will, in effect, err on the side of conservatism. This procedure helps insure the validity and interpretability of the coding from systematic differences in coders' handling of ambiguous coding situation. Decision rules guided by the same rationale will be provided for resolution of other coding difficulties in which the coder is unable to choose on the evidence between two categories.

Level of Question*

After noting the identity of the target student involved, whether the public interaction is student-initiated or not, and the type of response opportunity, the coder now records the cognitive level of the interaction (or Level of Question). Cognitive level refers here to the nature of the response demand made upon the student. Three levels are identified: Process, Product, and Non-Mathematics. The first two levels refer only to public interactions concerned with mathematics content. The third category (Non-Mathematics) is used to code all public interactions that do not refer to mathematics. Such public interactions deal with subject matter other than mathematics or have to do with personal experiences or opinions. Level of Question is recorded for each public interaction regardless of whether it is teacher-initiated or student-initiated, and only one of the three categories is marked.

*See Appendix Three for additional discussion.

Process (Higher Cognitive Level)

Process is a more complex level of thinking than Product. At the Process level a student indicated by a question or by a response, knowledge or thinking more complex than simple recall of facts or algorithms. Process level interactions require the student to integrate facts or show knowledge of their interrelationships. Often a Process level interaction includes a why question. For example, "Why does $3 \times 4=12$?" is at the Process level. In many cases the thinking required to solve a story problem or application problem leads to Process interactions. Discussion or presentation of new concepts may bring about Process level interactions. As a teacher asks questions of students to lead them to understanding of a new mathematics topic often more than recall is required of students. An interaction concerning $1/2 \times 12=6$ and $12 \div 2=6$ would not be Process if it dealt with those two facts as separate computations. However, an interaction about the interrelationship between division by 2 and multiplication by 1/2 could be Process unless only recall were involved. A Process level interaction requires thought on the part of the student beyond simple recall of facts.

Product (Lower Cognitive Level)

Product level interactions seek to elicit a single correct answer which can usually be expressed in a single word or a short phrase. Product interactions differ from Process interactions in that they only require knowledge of a specific fact and do not force the target student to integrate several facts or to make inferences from them. Product

interactions often begin with "what?," "when?," "where?," "how much?," or "how many?." In mathematics the most common form of Product level interaction occurs when the teacher asks a student to find the answer to a computation problem and state the answer. For example, "How many sides in a triangle?" is coded Product. Many Public interactions will be coded as Products as when the target students is asked to give the answer to a homework or classwork problem. While the student may have to go through a lengthy thought process to find the answer, the interaction is still coded as Product because the student only has to verbalize the answer and not the entire thought process.

One specific type of Product level interaction occurs when the student is asked to select from among two or more alternatives for the correct answer to a question. A complex question, phrased as an either-or question is still coded as Product. For example, "When you divide 2/3 by 3/4, is the answer larger than 2/3 or smaller than 2/3?" is coded Product because it is essentially an either-or question in which the respondent only has to make a choice of two or more alternatives.

Non-Mathematics Questions*

The preceding distinctions between Process and Product apply only to interactions dealing with mathematics. The two types of questions differ from one another in the complexity of response demand made upon the students, but they have in common the fact that they apply only to mathematical subject matter. The category Non-Mathematics includes all

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Public Teacher-Initiated and Student-Initiated interactions which do not fit the preceding two categories because they ask the student or teacher to make some non-mathematical contribution to classroom discussion (questions about personal experiences, preferences or feelings, requests for opinions or predictions, discussion of non-mathematical subject matter such as English grammar, etc.). Non-Mathematics interactions will often occur during breaks in academic routine, although they may also be asked at any time during formal lessons. They may occur when the teacher is introducing a lesson for the day ("Have you ever gone to Chicago? How long did it take to travel to Chicago?"). Questions such as these, while relevant to the coming lesson, do not require the child to show skill or knowledge of mathematics; they merely ask the child about previous experiences.

The distinctions made previously between Process and Product within the realm of mathematics content do not apply to Non-Mathematics questions. That is, any Non-Mathematics interaction is simply coded as such, regardless of the apparent response demand built into the question. Most Non-Mathematics interactions are product interactions and would be coded as such <u>if</u> they were about mathematics. The child is asked an either/or question or a question which is answered yes or no. Coders should be particularly alert to avoid confusing the coding of such questions. If a question deals with mathematics knowledge or skills it is coded as Product. If it deals with personal experiences, opinions or other non-mathematical matters, it is coded as Non-Mathematics. The proper coding of Level of Question therefore, requires two separate

coding decisions: (a) first the coder must decide whether or not the interaction pertains to mathematics; (b) if it does pertain to mathematics, the coder must also decide whether it is Process or Product. The latter distinctions are not made among the Non-Mathematics questions, which are coded under the single label.

At times it may be difficult to distinguish between Process or Product interactions and Non-Mathematics interactions. The question as asked may be ambiguous ("What do you think would happen if . . ."), and the observer will have to wait for the teacher to respond to the student in some way that indicates whether the interaction is related to mathematics or not. If the teacher is searching for a particular kind of answer and treats the target student's responses as right or wrong, the question is treated as a mathematics question. As such, it is coded as either Process or Product. On the other hand, if the teacher simply accepts any answer that the student gives and seems to be merely trying to get students to talk or to make a guess, the question is coded Non-Mathematics. In general, then, if the teacher seems to be using the question to teach or test mathematics knowledge, the question will be coded as Process or Product. If the teacher treats the student's responses as opinions or guesses and does not evaluate them as correct or incorrect, the question is coded as Non-Mathematics.

Student's Answer*

Student's Answer is coded only for Public Teacher-Initiated Interactions and should not be coded for Student-Initiated interactions.

*This section is taken from the Brophy-Good manual with minor editing.

In this case student's answer is left blank. For Teacher-Initiated public interactions one of the four student answer categories must be marked. The observer codes the Student's Answer in one of four categories: Correct, Part Correct, Incorrect, and No Response. The teacher's reaction is taken into account in determining the correctness of the student's response. Frequently, teachers may ask ambiguous questions which are answered correctly or partially correctly from one point of view but which are treated as incorrect by the teacher, who was looking for a very specific answer. Thus, it is the teacher's perception of the correctness of the target student's response which is coded, not the coder's perception. This distinction is important because the next variable coded is the teacher's Feedback to the Student's Answer as perceived by the teacher. Consequently, if the teacher reacts to a response as if it is wrong, it is coded as wrong, even though another observer might consider it to be partially or even completely correct.

Correct*

If the target student responds to the teacher's question in a way that satisfies him/her, the answer is coded as Correct. Determination of whether or not the teacher is satisfied with the target student's response does not necessarily require that the teacher positively affirm the answer or make some favorable response to it. Instead, the target student's answer should be considered correct unless the teacher makes

*This section is taken from the Brophy-Good manual with minor editing.

some positive action suggesting dissatisfaction with it (explicitly explaining that the target student's answer is incorrect or only partially correct, giving the "correct" answer, or asking someone else to answer the same question). If the teacher does not make an attempt to improve upon or replace the student's answer with another, the answer is considered Correct. This means that some answers that the coder would not accept but which the teacher treats as correct are to be coded as Correct answers. When a student is asked to respond in an interaction coded Non-Mathematics, the student's response is always coded Correct.

Part Correct*

Part Correct answers are responses which are correct but incomplete as far as they go or answers which are correct from one point of view but not the answer that the teacher is looking for. Again, the teacher's Feedback response may determine the way the answer is coded. If the teacher indicates that the target student's response is correct but incomplete, or if she/he indicates that the response is correct or defensible but not the answer that she/he is looking for, code the response as Part Correct.

Incorrect

Responses coded as Incorrect are those in which the target student's response is treated as simply wrong by the teacher. The teacher need not explicitly tell the target student that she/he is wrong; the teacher may indicate this indirectly by searching for the answer from someone else or by providing it himself/herself. In one

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of these ways, the teacher indicates that the target student's answer is not an acceptable response to the question asked.

No Response

The preceding three types of answers (Correct, Part-Correct and Incorrect) all refer to instances in which the target student makes a substantive response to the teacher's question. All cases in which the target student fails to do so, either by making no response whatever or by indicating through word or gesture inability to answer the question, are coded as No Response. The student need not make some positive action to be coded in this category; if the teacher asks a question and waits a time for an answer but then moves on to somebody else when the student does not respond, the first student is coded for No Response. Occasionally, an ambiguous situation will arise when the target student mumbles something indistinct. If the teacher reacts in this situation as if he/she has understood the student to make a substantive response, the response will be coded in one of the preceding three categories. If the teacher cannot understand the target student, No Response is coded.

Feedback*

The last aspect of public teacher-student interactions to be coded is teacher feedback. For a Teacher-Initiated Public interaction, teacher Feedback is the teacher's response to a student answer. For a Student-Initiated Public interaction, characteristics of the teacher's response to a student question or comment are coded under teacher Feedback. Feedback is coded for each public interaction.

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*Portions of this section are drawn from the Brophy-Good manual.

After identifying the student by number, coding the type of Response Opportunity, the Level of Question, and the quality of the target Student's Answer, the coder completes the sequence for coding Public interactions by indicating the nature of teacher's Feedback reaction to the target Student's answer.

Notice that the section of the coding sheet for teacher Feedback is different from the other sections of the sheet. The circles in the feedback section contain the numerals 1, 2, and 3. Although getting reliable data about order of feedback is difficult, the numerals may give information about the order of occurrence of types of feedback in situations where the teacher gives more than one type of feedback to a single student response or student question. Four types of teacher feedback are coded in this system: Positive Feedback, Neutral Feedback, Negative Feedback, and Sustaining Feedback. At times, the teacher will give more than one type of feedback for a given student response. For example, when a target student answers a question incorrectly and the teacher responds by saying that the answer is incorrect, at times the teacher continues with that student by asking the same question but in a rephrased form. Under this circumstances the teacher has used two different types of feedback with the student. The teacher has used Negative Feedback followed by Sustaining Feedback. This coding sheet maintains the ordering of the types of feedback given. So for the example given above, the <u>one-circle</u> should be marked for Negative Feedback since the negative feedback was given <u>first</u>. The <u>two-circle</u> on the same line should be marked for Sustaining Feedback since that feedback was given <u>second</u>. Up to three types of Feedback may be recorded for a particular

student response. In the rare situation when more than three types of feedback are given by the teacher only the first three are recorded on the coding sheet. The four types of teacher feedback to be coded are described below.

The first three Feedback categories (Positive, Neutral, and Negative) are designated as Terminal Feedback, which differs from Sustaining Feedback. The categories of Sustaining Feedback include teacher behavior which prolongs the public interaction by providing a second chance to deal with the same or related questions. Use of Sustaining Feedback reactions is an index of the teacher's willingness to stick with the target student until she/he can produce an acceptable answer. Terminal Feedback, on the other hand, brings the interaction to a close. In a Terminal Feedback reaction, the teacher either gives the target student the answer or sees that she/he gets it from someone else, or merely makes a feedback or evaluation response without supplying the answer. In either case, the teacher does not sustain the interaction and provide additional opportunity to interact. Redundant repetitions within the category of Terminal Feedback are <u>not</u> multiply coded. For instance, the comment "Yes, that's right, it's improper" would simply be coded as <u>one</u> instance of Positive Feedback (not as three instances).

At times, teacher Feedback to a target student may contain comments which are of interest other than as Feedback reactions. When the teacher gives Feedback which contains certain types of comments, the teacher's behavior is coded in two different places on the coding sheet. Since the teacher has given feedback to the target student, the appropriate Feedback category or categories are coded. At the same time, the teacher

may have commented about Confidence, Usefulness, Stereotyping, Enjoyment, Expectations, or Attributions. These aspects of the teacher's Feedback are noted either under Teacher Comments or are written with Observer's Notes. A description of the coding procedure for Teacher Comments is given after the section in this manual concerning Non-Public teacher-student contacts.

Positive Feedback

Positive Feedback is coded whenever the teacher affirms that the target student's response is Correct or the teacher praises the target student in some way as feedback to a student response. In the event that the teacher expresses both praise and that the student's response is correct without any other type of feedback in between, only one Positive Feedback is recorded. Positive Feedback may be indicated either verbally ("Yes," "That's right," Okay," "Great!" etc.) or non-verbally (shaking head up and down). At times teacher may habitually respond to any student response with "Yes," or "Okay." Even though this feedback may appear to have a neutral effect on students, it should still be coded as Positive Feedback.

Neutral Feedback

Neutral Feedback is coded when the teacher gives no feedback to the target student or when the teacher asks another student the question without indicating whether the first student's response was Correct or Incorrect. Thus, feedback which does not indicate the correctness or incorrectness of the target student's response and at the same time does not praise or criticize the target student's response is coded as Neutral Feedback.

Negative Feedback

When the teacher responds to a target student's answer by indicating that the student's answer is Incorrect, this is coded as Negative Feedback. In addition, any instance of teacher anger, criticism, or disgust expressed in response to a student answer is coded as Negative Feedback. Negative Feedback may be expressed either verbally or nonverbally.

Any verbal response which disparagingly refers to the target student's intellectual ability, or more frequently, his/her motivation to do good work, is coded as Negative Feedback. Statements of the latter type by the teacher may be factually true (i.e., the student may not have been paying attention) or may be unverifiable gratuitous rejection ("You just don't care."). Both are nevertheless coded as Negative Feedback, since this coding refers to the teacher's behavior per se and not to the veracity or justification for teacher statements. Some types of criticism should be coded in Teacher Comments in addition to being coded as Negative Feedback.

Sustaining Feedback

The category Sustaining Feedback indicates the teacher sustains the interaction and provides the target student with a second chance to respond. A first example of such a reaction is when the teacher simply repeats the question. Many times this will occur when the target student has made no response, although it may also occur at times in which he/she has given an incorrect response. In any case, if the teacher asks a question, waits some time without getting the correct answer, and then repeats the question to the same target student, his feedback reaction

is an example of Sustaining Feedback. The teacher need not repeat the entire question word for word in order to be coded in this category. Truncated versions of the original question and short probes to determine if the target student can make any response to the original question, are both coded as sustaining feedback. For example, to the original question, What is the answer to #24?" the following responses are all coded as Sustaining Feedback: "What number?" "Well?," "Do you know?" "John?" (The latter said in a manner that communicates that the teacher is waiting for the target student to respond to the original question).

Another example of Sustaining Feedback occurs when the teacher sustains the response opportunity by rephrasing the question or giving the target student a clue as to how to respond to it. Usually the rephrasing of the question in this situation will be such as to simplify it, particularly in moving from one question ("Is it proper or improper?"). Rather than rephrase the question in this manner, the teacher may provide a clue expressed as a declarative statement: "Its value is greater than 1."

The material provided by the teacher in rephrasing the question or giving a clue may or may not be helpful for the target student -- certain types of clues may actually confuse rather than help. This fact should not be allowed to influence the coding. So long as the teacher does something which is intended by the teacher to help the target student answer the original question, the teacher's action is coded as Sustaining Feedback.

Sustaining Feedback is also coded when the teacher asks a new question of the same target student as feedback to that target student's

response. The occurrence of Sustaining Feedback presents a special coding problem because this type of feedback gives the target student a new Public interaction. This new interaction must then be coded for Level of Question, quality of answer, and Feedback from the teacher. At the same time, the fact that it is a follow-up to an original interaction rather than a wholly new interaction must be maintained in the coding system. This is accomplished by skipping down to the next row whenever sustaining feedback is coded, thereby bringing a close to the coding of the original interaction and beginning the coding for the follow-up interaction. On the next line, the Level of Question, the quality of the target Student's Answer, and the nature of the teacher's further Feedback are recorded and the target student's number is repeated in the student number section. Thus, coding of type of Response Opportunity is done only for original interactions; follow-up interactions occurring due to Sustaining Feedback in reaction to the original interaction are coded only for Student Number, Level of Question, quality of target Student's Answer and type of teacher Feedback.

Proper coding of such a sequence is exemplified in rows 2, 3, and 4 of the sample coding sheet found in Appendix One. Beginning in row 2, the coding example implies that the teacher asked a Direct question of target student number 6, that the question was a Product question, that the target student failed to give a response and that the teacher reacted in this instance by repeating the question. After coding the preceding information as in row 2 in the example, the coder then moves down to row 3 and codes the information there which says the following:

The question is a Product question (since it is a repeat of the original question); the target student this time answers incorrectly; the teacher reacts this time by negating the wrong number and then by rephrasing the question or giving a clue. Since this sequence also culminates in the appearance of Sustaining Feedback, as noted by the "2" under the Sustaining column, the coder again moves down a row and codes the third interaction of the sequence in row 4. In this instance, the coding in the example tells that the rephrased question was a Product question; that the target student responded correctly this time; and that the teacher reacted by affirming the correctness of the target student's response as his Terminal Feedback. Thus, in the example provided an original Response Opportunity as noted in the column under the Direct questions eventuated in three different interactions, each of which was coded for student number, Level of Question, quality of target student's response and the type of Feedback. The coding allows for retention of all of this information in the sequence in which it occurred, as in the example in Appendix One. The fact that the sequence occurred as an original interaction that was followed up by two others rather than three separate and unrelated interactions is also preserved in the coding.

Since it is rare for more than three responses to occur as teacher feedback to a single response by the target student, only three columns are printed on the coding sheet. Thus, the observer codes the <u>first three</u> teacher feedback responses as described above and must ignore any further feedback to a single student response. If a fourth or fifth feedback response is particularly noteworthy, the observer should note its occurrence in Observer's Notes on a separate sheet of paper.

Non-Public Teacher-Student Interaction*

The preceding material has dealt primarily with the coding of public interactions. Description of the coding procedures involved has frequently been complicated because of the many distinctions to be made and the necessity for maintaining the sequence of events in the coding of the interactions. The coding of Non-Public interactions to be described below typically requires only darkening the circle for the target student's number and the appropriate circle to describe the interaction.

Non-Public teacher-student contacts differ from Public interactions in that the teacher is dealing privately with one target student about matters idiosyncratic to him/her rather than publicly about material meant for the group or class as a whole. Non-public teacher-student interactions are not always private (the teacher may talk in a loud voice or address the child from across the room). Such interactions are nevertheless coded as Non-Public as long as they involve matters idiosyncratic to the target student and the attention of the class is not on the interaction. The Public or Non-Public decision is made based on where the attention of the class is. If the attention of the whole class is on an interaction, it is coded as Public. If the attention of the class is not on the interaction, it is coded as Non-Public.

Non-Public interactions are divided into Procedural and Work-Related contacts. They are also separately coded according to whether they are initiated by the teacher or by the student. The coding also reflects certain aspects of the teacher's behavior in such contacts.

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*This section is taken from the Brophy-Good manual with minor editing.

Work-Related

Work-Related contacts include those teacher-student contacts which have to do with the pupil's completion of seat work or homework assignments. They include clarification of the directions, soliciting or giving help concerning how to do the work or soliciting or giving feedback about work already done. Work-Related interactions are considered Student-Initiated if the target student takes it upon himself/herself to bring his/her work up to the teacher to talk to him about it or raises his/her hand or otherwise indicates that he/she wants to discuss it. Work-Related interactions are coded as Teacher-Initiated if the teacher gives feedback about work when the target student has not solicited it (the teacher either calls the target student to come up to his desk or goes around the room making individual comments to the students). Student-Initiated contacts are not planned by the teacher and occur solely because the target student has sought the teacher out; Teacher-Initiated contacts are not planned by the target student and occur solely because the teacher initiates them. Separate space is provided for coding Student-Initiated and Teacher-Initiated Work-Related interactions on the coding sheet, and the coder indicates the initiator of a Non-Public interaction by the place where the interaction is recorded.

In addition to noting the interaction as a Work interaction and as an interaction which is Student-Initiated or Teacher-Initiated, the coder also indicates the nature of the Feedback to the target student during the interaction. This is indicated by using one or more of the five columns provided for coding Feedback in Work-Related interaction: Praise, Process Feedback, Product Feedback, Criticism, or Don't Know.

The first four of these categories have the same meaning as they have in other coding of Teacher Feedback. The additional Don't Know category is added for this coding because frequently the Non-Public teacher-student interaction will be carried on in hushed tones or across the room from the coder where she/he cannot hear the content of the interaction. In such cases, where she/he is unable to code the nature of the teacher's Feedback because she/he cannot hear it, the coder notes the occurrence of the Work-Related interaction and the fact that it was either Teacher-Initiated or Student-Initiated by darkening the circle in the Don't Know column. Coders should note that the Don't Know column has a very special and specific meaning for this coding. It should be used only when the coder cannot hear the teacher's Feedback. It must not be used when the coder is unsure about whether to code the teacher's feedback as Process or Product. Thus, use of this column signifies that the coder could not hear the interaction, not that she/he has difficulty in making a coding decision on the basis of something that she/he was able to hear. When a coder is unsure as to whether to code Process or Product Feedback, she/he should code Product Feedback as in any other situation. Similarly, if she/he is unsure whether to code Praise or Criticism in addition to Product, she/he should code only Product thus preserving the coded instances of Praise and Criticism to those cases in which the coder was sure of the coding. Thus, entries in the Don't Know column will indicate solely that the coder could not hear the teacher Feedback in the interaction involved.

The coding steps to be taken in the coding of Work-Related contacts may then be summarized as follows: (a) the coder darkens the Student's

Number; (b) the coder determines whether the contact is initiated by the teacher or by the students; (c) the coder then determines that the contact is indeed a Work-Related contact and not one of the other types of contacts; (d) the coder notes the teacher's response to the student or the feedback given to him/her and at this point darkens the appropriate circle; (c) should the teacher produce additional Feedback responses to the target student besides that already indicated in the coding, the coder darkens additional circles next to the original one darkened.

Procedural

The category of Procedural Contacts includes all Non-Public teacher-student interactions which are not coded as Work-Related contacts or as Behavioral contacts. Thus, it includes a wide range of types of interactions, most of which are initiated on the basis of the immediate needs of the teacher or target student involved. Procedural contacts are initiated by the target student for such purposes as seeking permission to do something, requesting needed supplies or equipment, reporting some information to the teacher (tattling on other students, calling the teacher's attention to a broken desk, etc.), getting permission or information about how to take care of idiosyncratic needs (going to locker, getting a pass to get help during another period, etc.), as well as a variety of other contacts. In general, any interaction initiated by the target student which does not fit the definition of Work-Related contacts is coded as Procedural contact. Procedural contacts initiated by the teacher usually have to do with classroom management or with the teacher being aware of and handling some idiosyncratic need in the target student.

Examples include asking individual target students to run errands, carry out a particular clean-up job, pass out equipment or supplies, and similar interactions in which the teacher enlists the target student's aid in classroom management, as well as contacts initiated by the teacher to handle a particular situation idiosyncratic to the target student involved (to see if he/she is sick, to give him/her a note to take home to his/her parents, etc.). In general, any Non-Public interaction initiated by the teacher that does not fit the definition of Work-Related or Behavioral interactions is coded as a Teacher-Initiated procedural interaction.

As with Work-Related interactions, Procedural interactions are separately coded on the coding sheets according to whether they are Teacher-Initiated or Student-Initiated Procedural contacts. The coder indicates the nature of the teacher's response in addition to the target student's identification number. Three categories for coding teacher's response are provided: Praise, Neutral, and Criticism. Praise and Criticism have the same meaning here as elsewhere and are coded if they occur as part of the teacher's response. All teacher reactions to Student-Initiated Procedural contacts which do not contain praise or criticism are coded as Neutral. This means that a large variety of teacher reactions will be coded in the Neutral category, reflecting the heterogeneity of types of Procedural contacts. Thus, coding of a Student-Initiated Procedural contact Neutral means that the teacher responded in some way to the target student's expressed need or question without either praising or criticizing him/her. The numbers in rows 15, 16, and 17 of the Student-Initiated Procedure Non-Public column in the example

Teacher-Student Interaction sheet in Appendix One exemplify the proper coding of these instructions. In row 15, the number 6 and the other darkened circle indicate that target student number 6 approached the teacher on a procedural matter and was criticized by him/her. The mark in the Neutral column next to the criticism indicates that the teacher also gave some feedback to the target student's need in addition to criticizing. The criticism involved may have been due to the fact that the target student left his/her seat to come and see the teacher, or it may have been connected with the particular procedural matter that the target student did in fact approach the teacher on a procedural matter, that the teacher's response was to criticize him/her for something, and that the teacher also gave feedback regarding the procedural matter itself. The numbers in the rows 16 and 17 indicate that target student number 0 and target student number 1 came individually to the teacher on procedural matters and were given Feedback regarding those procedural matters without any teacher Praise or Criticism being involved.

Occasionally, there will be difficulty determining whether a given teacher-student Non-Public interaction should be coded as Work-Related or Procedural. Most confusion will be eliminated in this area if it is remembered that any questions or clarification about the directions for the assignment involved are coded as Work-Related, while questions having to do with equipment or supplies are coded as Procedural. Thus, if the target student asks the teacher to repeat the page numbers that he/she is supposed to complete in his/her workbook, asks if he/she should start the assignment right now or later, or has some other question regarding the immediate specifics of the assignment, the interaction is coded as a

Work-Related dyadic contact. On the other hand, if the target student comes up to the teacher before starting his/her assignment because he/she needs a pencil, has run out of paper or has some other problem with supplies, the interaction is coded as a Procedural interaction.

Behavioral Interactions

Behavioral contacts are coded whenever (Public or Non-Public) the teacher makes some comment upon the target student's classroom behavior and are coded at the right side of the coding sheet. Behavioral contacts are subdivided into Praise and Criticism. The coder notes the information by entering the target student's identification number and darkening the circle in the appropriate column. The conditions for coding this category are: (a) the teacher singles out the target student for comment upon his/her classroom behavior; (b) the interaction concerns only his/her behavior and does not involve praise or criticism in connection with Work-Related or Procedural contacts as defined above.

Praise

Occasionally, target students will be singled out for special praise for their classroom behavior. Praise coded in this category will also sometimes occur after activities but not in relation to specific responses during those activities) ("Pat must have studied hard last night."). Idiosyncratic teacher euphemisms that carry the same sorts of meanings as the preceding examples are also considered to be Praise ("Lee is really hanging in there today."). Whenever the teacher singles out a target student for such praise, coders should darken the appropriate

target student's number and Praise under Behavioral Teacher-Initiated interactions.

Criticism

This category refers to teacher behavior in singling out for comment a target student engaging in inappropriate or undesirable classroom behavior. Comments which function as either warnings or criticism are coded in this category. Usually teacher's warnings will occur in situations in which the target student is doing something that is not necessarily or always prohibited but which is troublesome at the moment. In such instances, the teacher will single out the target student to inform him/her that his/her present behavior is inappropriate. Examples of this are as follows: "Lee, you're getting too noisy" "Try to figure out the answer on your own, don't copy from your neighbor" "Pat, you can talk to Bill if you want to, but stay in your seat."

Behavioral instructions given to the child merely in the interest of information or classroom management and without any connotation of warning or criticism would be coded as Teacher-Initiated Procedural contacts. The same instructions given in a slightly different context which connoted more of a warning and perhaps implied that the child should know better ("John, sit down, Mary can't see when you stand up like that.") would be coded as Behavioral Criticism. If the same sentence were snapped at the child or delivered with anger or exasperation, it would also be coded as Behavioral Criticism.

Coding of behavioral evaluation is exemplified in the final three columns of the Teacher-Student Interaction coding form in Appendix One.

The marks in the next to the last row indicate that target student number 6 was singled out for Praise by the teacher. The marks in the last row indicate that the teacher delivered Behavioral Criticism to target number 2.

Teacher Comments

Certain types of teacher comments which are directed to individual target students in public or in private are to be recorded. Some types of teacher comments are recorded on the Teacher-Student Interaction coding sheet, while other types of Teacher Comments are recorded on a separate sheet of paper with other observer remarks. Teacher comments may occur during other teacher-student interactions. The observer records teacher comments concerning: students' Confidence in learning mathematics, the Usefulness of mathematics, Sex Stereotyping of mathematics, student Enjoyment or liking of mathematics, teacher Expectations for student performance in mathematics or school, and Teacher Attributions of the causes of student success and failure. Only Teacher Attributions are coded on the Teacher-Student Interaction coding sheet. The other types of teacher comments are recorded on a separate sheet of paper.

Teacher Attributions

At times, teachers attribute the cause(s) of a target student's success or failure in mathematics to some perceived characteristic of the target student or her/his surroundings. For this observation, these causes are classified as: the target student's ability or lack of ability, effort or lack of effort on the part of the target student, the

ease or difficulty of the task, or the environment of the classroom including the quality of teacher explanations. Attributions of causes of success for target students are separated from attributions of causes of failure. Eight categories of teacher attributions are coded on the Teacher-Student Interaction observation sheet. One column is provided on the coding sheet for each of the eight categories of Teacher Attributions. These columns are located between the Public and Non-Public sections.

A Success-Ability (S-A) attribution is coded when the teacher refers to ability as the reason for a target student's success. A Success-Effort (S-EF) attribution is coded when the teacher makes a reference to the amount of time, effort, or concentration a target student seems to have expended as the cause of that student's success. A Success-Task (S-T) attribution is coded when the teacher refers to the ease of the material of or the target student's familiarity with the material as the reason for the student's success. When the teacher makes reference to the positive classroom environment or the good job that was done in explaining as the cause of the target student's success, a Success-Environment (S-EN) attribution is coded.

When the teacher attributes a target student's failure to grasp an idea to a lack of ability or talent, a Failure-Ability (F-A) attribution is coded. A Failure-Effort (F-EF) attribution is coded when the teacher refers to a failure to spend sufficient time on a task, failure to concentrate on a task, or a lack of determination as the cause of a target student's failure to understand or learn a concept or idea. When the teacher attributes a target student's failure to learn something to the

difficulty of the task, a Failure Task (F-T) attribution is coded. At times, the teacher will attribute a target student's failure to the fact that the material was not explained well or that the learning environment was not a good one. Such attributions are coded as Failure-Environment (F-EN).

When a Teacher Attribution comment occurs as part of an interaction between a target student and the teacher, the attribution is coded in the same row as the student number and other description of the interaction. If the comment occurs outside of a normally coded interaction, the student's identification number should be darkened and the appropriate attribution circle darkened also.

When the types of teacher comments concerning Confidence, Usefulness, Stereotyping, Enjoyment, and Expectations occur, the comment should be recorded on another piece of paper with other observer remarks. Be sure to record the comment and the student's identification number. These non-attribution comments are described below.

Confidence

Comments concerning a target student's confidence in mathematics are classified as positive, negative, or neither positive nor negative (+, -, N). A positive comment about a target student's mathematical confidence gives some indication that the teacher perceives the student as confident in his/her ability to learn mathematics. When the teacher states that she/he feels a target student is low in confidence concerning her/his ability to learn mathematics (or anxious about mathematics) a negative comment is coded. A comment about student Confidence that falls

in neither of these categories is coded as neither positive nor negative.

Usefulness

Usefulness comments by the teacher which are directed to an individual target student are classified positive or negative. A comment classified as positive is one which indicates that mathematics in general or some specific mathematical topic will be useful to the target student. A comment concerning the Usefulness of mathematics is considered negative if it indicates that mathematics or the specific topic under consideration will not be useful for the target student.

Stereotyping

At times, teachers comment about the appropriateness of studying mathematics for males or females. A positive Stereotyping comment is one which is directed to a target student and which indicates that mathematics is equally appropriate for females and males or which says that mathematics ought to be free of Sex Stereotyping. A comment to a target student which says that females are better at math than males is also considered a positive Stereotyping comment in favor of females. A negative Stereotyping comment gives the idea that math is not an appropriate subject for a female student to excel in or that males are more suited to the study of mathematics than females. A teacher comment indicating that girls and boys are equally capable in mathematics should be recorded also, as a Non-Stereotyping comment.

Enjoyment

A positive comment by the teacher is one which gives the indication

that the target student likes mathematics or enjoys doing some aspect of mathematics. A comment stating that a target student dislikes mathematics or does not enjoy doing some specific mathematical work is coded as negative. When the teacher comments that a target student neither likes nor dislikes mathematics, neither positive nor negative is classified.

Expectations

When a teacher tells a target student that she/he will probably do well in mathematics or be successful in school, a positive Expectation comment is coded. A negative Expectation comment is classified when a target student is told that he/she probably will not be very successful in mathematics or in school.

GENERAL CODING CONVENTIONS: VALIDITY*

Certain general coding rules and conventions have been established which cut across all the coding categories and which may be relied upon for guidance in determining what to do in ambiguous situations. These conventions were established with particular attention to the problem of ensuring the validity of data in studies of teacher communication of expectations through differential behavior toward different students. The basic general conventions are as follows:

1. Nothing is coded whenever the coder is not sure which target student was interacting with the teachers. Do not guess about the

*This section is taken from the Brophy--Good manual with minor editing.

identity of the target student. This convention is important to avoid contamination of observation data by the expectations of the coder. Guesses about the identity of the students in ambiguous situations are likely to be influenced by the coder's expectations of which students would be likely to have the sort of dyadic interaction with the teacher that has just occurred. While this problem will occur rarely, it sometimes does happen that the coder is aware of an interaction but was not able to determine which student was interacting with the teacher. In these situations, the occurrence of the interaction is ignored, and nothing is coded at all.

2. The coder makes decisions concerning the correctness of a Student's Answer by noting the teacher's reaction to the answer. If an ambiguous or even a correct answer is considered to be Incorrect by the teacher, it is coded as Incorrect in coding the Student's Answer. Similarly, the teacher may ask one type of question but phrase it ambiguously so the target student can respond to it in a different way. Consider the following example:

TEACHER: John, can you tell me how much 3/4 times 8/9 is?
JOHN: Yes. (This response is possible, although it occurs rarely.)
TEACHER: Well, how much is it?
JOHN: Two thirds.

The preceding example and similar situations should be coded as a single instance of a Product question, not as a Non-Mathematics question followed by a Product question.

Teachers may frequently ask rhetorical questions in which they do not expect the target student to produce an answer. These are not considered to be questions and are not counted as interactions for the target

student even if the target student should overtly answer the question ("The distance is over 100 miles, isn't it?"). On the other hand, Product questions similarly phrased which the teacher is treating as questions and which she/he expects the target student to respond to are treated as questions and are coded. When the coder is uncertain, no interaction is coded.

3. Coders should be thoroughly familiar with rules regarding the handling of ambiguous coding situations. For borderlines between related categories there is a rule stating what to do in situations in which the coder cannot decide between the two categories. These rules should be memorized and used universally so that certain categories can be kept "clean" and restricted to situations in which the coder was sure of his/her rating.

4. At times a Non-Public contact between a teacher and individual target student may extend over several minutes. Such a contact is coded as one interaction regardless of how long it goes on if it is uninterrupted. This means that if a target student asks the teacher a question and the teacher launches into an extended process review, one interaction is coded by darkening: (a) the student number and (b) the process circle in the Non-Public Student-Initiated Work region. It is noted only one time and repeated instances of the same type of behavior are not multiply coded. Similarly, in giving feedback to the target student in an individual Non-Public interaction such as this, the teacher might ask several questions as a way of helping him/her discover how to do the work. Such questions are occurring as part of the Teacher-Initiated or Student-Initiated Work-Related contact and

therefore are not coded as separate interactions. When the teacher or another student interrupts a Non-Public interaction such that the teacher talks with another student before returning to the original interaction, a new interaction is coded to indicate that the teacher returned.

This convention may appear unwarranted or illogical at times, especially when a particularly long and noteworthy Non-Public interaction is observed, but it is consistent with the other facets of this measurement approach. To code more than one interaction in such situations, or to attempt to multiply code the separate units of teacher behavior that might occur during a single unit, would be to introduce inconsistency that would dissipate the validity of frequency measures for the dyadic contact categories. For example, if difficulty in understanding the teacher produced longer average interactions and a greater number of teacher messages per interaction, the less-able target student would be credited with a greater number of such interactions and/or a greater richness of interaction than would a target student who was able to understand and more quickly incorporate the teacher's Feedback. This is in a sense a special case of the more general principle mentioned above: The coding must reflect the teacher's behavior rather than the target student's response to it.

5. Occasionally, unforeseen types of interactions or other classroom events will occur in which the coder is not sure whether to code the situation at all, or is not sure how to code it if she/he thinks it should be coded. In these situations, the coder should code the interaction in whatever manner makes sense to her/him at the time, but she/he

should be sure to indicate the units involved very clearly with a faint pencil mark and should at the first opportunity explain the situation in detail in the "remarks" section on another sheet of paper. These special situations should then be discussed with the project investigators as soon as possible (before the details are forgotten), so that determination can be made as to whether the data should be included in the study. This problem has come up with regard to games and other non-academic classroom activities. Recess, free play, and other obviously non-academic activities are not being coded. However, teachers will sometimes institute games which may be considered mathematically relevant. In such situations, the activities of the children are then coded as interactions with the special nature of the activity noted on the Observer Comment sheet. Determination of whether or not to use these data is made on the basis of whether or not the activity seems to involve enough elements of academic work to justify considering the response demands of the activity. If it is determined that the activity did not involve sufficient academic content to be comparable to the more clearly academic response opportunities, or if it is clear that the participation of the children was not under the control of the teacher (thereby making it not comparable with other coded activities), the data are excluded from the general analysis.

7. In coding Public interactions, coders should be sure to repeat the target student's number when Sustaining Feedback is involved. After Sustaining Feedback the continued interaction is recorded on a new line in the Public region. The new line must show the student number. Coders should also bear in mind that each Public interaction must be

coded for one or more types of Terminal Feedback. Be especially alert to mark Neutral Feedback in Terminal Feedback situations where this is appropriate. This is easy to forget.

Data-Collection Procedures

The Teacher-Student Interaction coding sheet contains sections labeled Observer, Day, Teacher, Student I.D., Student Number, Public, and Non-Public (Appendix One).* The Observer, Day, Teacher, and Student I.D. sections are filled in before observation. Two digit numbers are written in the boxes for Observer, Day, and Teacher and the appropriate circles are darkened below the boxes. Each target student is assigned a unique two-digit identification number. There are ten spaces marked Student I.D. Under each Student I.D. space there are two boxes. In these boxes the two-digit Student Identification numbers are written, and the appropriate circles are darkened below the boxes. Notice that a single digit (0-9) follows each pair of boxes. The correct circle below the single digit should also be darkened. This single digit will be used in the Student Number section to identify the target student involved in each interaction. On a given day a student has <u>one</u> single digit Student Number. However, a student's single digit number may change from day to day. The observer determines what single digit number to use for each student on a given day based on the classroom seating arrangement. Below each set of single digit circles is a circle

*The unlabeled region may be used as needed for extra target students or extra categories.

labeled absent. If a student is not in the classroom for any portion of the mathematics class this circle is darkened.

During observation the Student Number, Public, and Non-Public sections are marked. One line in the Student Number-Public-Non-Public block is used for each interaction coded. For each interaction, Student Number is coded by darkening the circle to match that student's single digit number. This identifies which student is involved in the interaction. To indicate characteristics of the interaction, circle(s) are darkened in the Public region or the Non-Public region on the same line with the Student Number. The number of lines of data is determined by the number of interactions. Additional coding sheets are used as needed and are marked with the same identification numbers as the first sheet.

Since the Public and Non-Public regions are not labeled with specific category names a special clipboard and guide have been designed to use when recording characteristics of teacher-student interactions. A photograph of the entire apparatus is shown in Appendix Four. The clipboard has special clips which hold the coding sheet and guide, and which allows the guide to slide smoothly over the sheet. The observation category names are printed on the guide. The guide serves as a set of category labels and also as a help in coding one interaction per line.

Circles on the coding sheet should be darkened with a number 2 pencil. All marks should be dark, should not extend outside the circle boundaries, and should fill the circle to be darkened. If an error is made, the incorrect mark should be erased completely. No marks should be made on the coding sheet other than writing in identification numbers

and darkening circles. Any stray marks should be erased. Both before and after data collection, the coding sheets should be transported carefully. If a sheet is folded, torn, or wrinkled, or has its edges bent, the sheet must be recopied since the scanner will not read a damaged sheet.

Observer Classroom Behavior

During observation it is important for the observer to be as unobtrusive as possible and to collect accurate data. The observer should locate him/herself so that it is easy to see which students are involved in interactions and whether or not the student volunteers. The side of the classroom is often a good place.

It is extremely important that the target students and their teacher do not know which students in the class are being observed. The observer must take care not to observe target students in such a way as to make clear to anyone in the class the garget student's identity. Seating charts should be kept well hidden from view during observation and should not be left loose in the classroom. In fact, it is wise to mark target students on the seating chart with some type of code to prevent the identity of target students from being revealed. When target students move around the room during mathematics class, the observer should be very careful not to be too obvious in following them. If following a target student would indicate that a particular student is a target student, the student should not be followed. If a target student leaves the classroom, he/she should not be coded even if he/she interacts with the teacher outside the classroom. Occasionally an entire group of students

leaves the classroom to work in the hall or the library. If the target student(s) in that group can be observed without giving away his/her identity, the observer may continue to code the student's interactions with the teacher. Another effective procedure for reducing target student awareness of the observer is the observation of non-target students. When a non-target student interacts with the teacher, the observer should act as thought she/he is coding the interaction without actually marking the coding sheet. Another approach to use when recording an interaction between the teacher and an individual target student is to wait a few seconds before writing. This reduces the likelihood that the teacher and students know who is being observed.

During observation it is advisable to avoid communication with any students. The observation requires concentration, and it is recommended that observers attend closely to the observation and coding. Close attention to the observation to the extent of avoiding eye contact with stndents will prevent students from asking questions of the observer. If students ask questions, either give no response or say that both you (the observer) and the student have work to do and should not be talking. Avoiding eye contact with students will reduce the number of students who approach the observer with questions.

Target Student Recognition

Observers will receive a list of target students along with a seating chart prior to the first observation. An important task for the observer is to learn to identify each target student by name and by appearance. In most classrooms students move around the classroom so that the

observer must be able to recognize students whether or not they are in their regular seats. It is of the utmost importance that the observer be sure he/she is observing the correct target students. On the first and second days of observation the observer may need to vertify absences with the teacher. This must be done carefully so as not to indicate to the teacher which students are target students.

Observer Comments Sheet

In addition to the coding sheet the observer also fills out an Observer Comment sheet daily. The Observer Comment sheet is used to record any unusual classroom events and any situation which is not sufficiently described by the observation categories. The content and context of certain teacher comments are written on this sheet along with general descriptions of target student behavior.

PART II

ENGAGED TIME

This part of the manual describes the observation system used to study the proportion of time students are engaged in mathematics learning activities and some characteristics of these activities. This system has been adapted from one developed by Romberg, Small, Carnahan and Cookson (1978) at the Wisconsin Research and Development Center for Individualized Schooling. The most important features to be observed are the characteristics of the activities target students engage in and the degree to which these students discuss mathematics with their peers. The physical location of the teachers and target students is also recorded.

The Engaged Time observation system used a "time sampling" technique to organize the collection of data. This means that target students are not observed continuously, but in a fixed sequence at fixed intervals during the class period. The order of observation of the target students in a class is determined by the observer at the beginning of the class each day. Once an order of observation for the target students has been determined on a day, the observer must maintain that order throughout the observations that day. However, the sequence of observation of students may be changed for each new day. The order of observation is determined based upon seating and grouping arrangements.

In the Engaged Time system one target student is observed at a time. Thirty seconds* is allowed for the observer to find the target student

*In classes where fewer than five students are observed, the length of cycle should be modified so that adequate sampling of the observation period is permitted.

to be observed, observe the activity in which the student is involved, and record the appropriate categories on the Engaged Time coding sheet. Specific portions of the 30 second time period are allotted for each of these observer activities. During the first 9 seconds the observer finds the target student in the classroom and begins to watch the student's behavior. At the 10 second mark, the behavior of the target student with respect to the observation categories is noted. During the final 20 seconds of the 30 second period, the observer records the behavior of the target student as observed at the 10 second mark. It is important that only the behavior of the target student at the 10 second mark, or sampled moment, is recorded on the coding sheet. This procedure is intended to minimize the possibility of observer bias in coding. A student may exhibit a variety of behaviors during the 30 second time period. By only recording the behaviors at the sampled moment, the observer is less apt to be influenced by his/her expectations for that student. By recording the behavior of the target student at the sampled moment, the data for a particular target student provides a series of "snap shots" of what the student does during an observation period.

Observation begins at the beginning of the time period designated for mathematics and ends when the mathematics period ends. If the class period begins and ends with bells, the observer begins and ends with the bell. If the beginning and ending of the period are not signaled by bells, the observer should begin coding when the teacher directs the students to mathematics and should stop coding when the teacher releases students or redirects students to some other area.

Target Student Recognition

Observers will receive a list of target students prior to the first observation along with a seating chart. An important task for the observer is to learn to identify each target student by name and by appearance. In most classrooms students will get up and move around the classroom so that the observer must be able to recognize students whether or not they are in their regular seats. It is of the utmost importance that the observer be sure he/she is observing the correct target students. On the first and second days of observation the observer may need to verify absences with the teacher. This must be done very carefully so as not to indicate to the teacher which students are target students.

It is extremely important that the target students and their teacher do not know which students in the class are being observed. The observer must take care not to observe target students in such a way as to make clear to anyone in the class the target student's identity. Seating charts should be kept well hidden from view during observation and should not be left loose in the classroom. In fact, it is wise to mark target students on the seating chart with some type of code to prevent the identity of target students from being revealed. When target students move around the room during mathematics class, the observer should be very careful not to be too obvious in following them. If following a target student would indicate that a particular student is a target student, the student should not be followed. If a target student leaves the classroom, he/she should be coded as absent for that sampled moment. Occasionally an entire group of students leaves the classroom to work in

the hall or the library. If the target student(s) in that group can be observed without giving away his/her identity and without missing a sampled moment for other target students, the observer may continue to code the student(s) as not absent.

Avoiding Communication with Students

During observation it is advisable to avoid communication with any students. The observation requires concentration, and it is recommended that observers attend closely to the observation and coding. Close attention to the observation to the extent of avoiding eye contact with students will prevent students from asking questions of the observer. At times students will ask the observer for help with their school work, or will ask the observer what they are doing. Observers will find that they cannot talk to students and code at the same time. Also, if students find that the observer will talk to them, they may be inclined to try to talk to the observer frequently. It students ask questions, either give no response or say that both you (the observer) and the student have work to do and should not be talking. Avoiding eye contact with students will reduce the number of students who approach the observer with questions.

Timing of Observation

A cycle consists of observation of each target student in the class in the sequence determined by the observer, and a 30 second break following the observation of the last target student. For example, if an observer begins observation at 9:30:00, the sampled moment for the first student would be at 9:30:10. The observer would complete the recording of the data from the first sampled moment by 9:30:30 and would then find

the second target student. The sampled moment for the second student would be at 9:30:40 and the data would be recorded by 9:31:00. At 9:31:00 the observer would look for the third target student and note the student's behavior at 9:31:10, the sampled moment. By 9:31:30 the observer will have completed the coding sheet for the third target student. The observer follows this same pattern until all target students have been observed once. Then the observed waits for 30 seconds and begins a new cycle, being careful to observe target students in exactly the same order as in the first cycle. At the end of the fifth cycle the observer takes a 60 second break.

Variation on the timing may occur occasionally. This is acceptable. What is important is that the sampled moment is precisely coded. If at some point the observer is distracted from the observation or loses track of the clock, the observer should start timing again being certain that no target student is skipped and the correct sequence of students is maintained.

Attending to Non-Target Students

It is very difficult to prevent target students from realizing they are the focus of observation. The avoidance of eye contact will help reduce the degree to which target students feel self-conscious. It is helpful to keep observation sheet, any list of names, or any seating chart out of the view of any students. This will prevent students from reading the names of target students. One very effective procedure for reducing target student awareness of observers is to attend to the behaviors of non-target students. This can be done by observing what

activities and materials they are using. At times, non-target students will be engaged in similar activities as the target students. Thus, it is possible to record the target student behaviors by observing non-target students.

Engaged Time Observation Categories

A list of the Engaged Time observation categories with descriptions of each follows.

Attendance

A = Absent

Target student is out of the observer's vision at the sampled moment.

Blank = Present

The target student is observed at the sampled moment.

This is used to indicate that the target student is not at school, or is otherwise unavailable to be observed at the sampled moment. A trip to the water fountain or washroom is coded as absence. If the target student is unavailable for several cycles, as when he/she is absent for the entire period, it is important that the observer nevertheless allow 30 seconds for that student in each cycle and code Absent at the appropriate sampled moments.

Student Engagement

E = Engaged

The student is engaged in a learning activity that involves mathematics content.

O = Off-task

Off-task describes the student when she/he is not engaged in an activity which involves mathematics.

The most important information obtained by the coding of pupil activity is the engagement or lack of engagement of the student when working on mathematics. That is, the crucial information to be obtained is the determination of whether or not the student is actually working on a mathematics task. If the student is engaged, then engaged (E) is coded. If the student is not engaged, then off-task (O) is coded.

The determination of engagement or non-engagement is central to the coding of pupil behavior, because this distinction is the most important of those involved in the time-sampled observation categories. Whenever there is ambiguity regarding student engagement, the observer should give the student the benefit of the doubt and code engaged. Off-task should be coded only when it is reasonably clear that the target student is not engaged in a purposeful mathematics task.

Several rules are necessary for the coding of engagement. If the target student is engaged in a mathematics activity, this is coded as engaged even though the teacher has assigned some other activity. If the student displays both a non-engaged and an engaged behavior for the same activity, then the engaged behavior is coded. For example, the student might listen to the teacher's explanation or directions while sharpening a pencil. In such cases, the engagement is coded. The student can be engaged in two activities at once such as copying one part of an assignment while listening to the explanation or direction of the teacher. If one of the activities is a process activity and the other

is a product activity, the level of engagement should be coded as process (S).

If the target student is not engaged in a mathematics activity, then this non-engagement is coded even when the student is engaged in an alternative activity other than a mathematics activity. The teacher could tacitly accept the off-task activity of the student. For example, a teacher might interrupt a student's mathematics seatwork to ask about the outcome of a baseball game played the day before. In this case, the target student is coded as off-task. The teacher's obvious acceptance of this socializing does not change its off-task characteristics in relationship to mathematics. Note that the coding is exactly the same if another student interrupts the target student to ask about the baseball game.

The off-task code is used in some cases where the teacher overtly states that the student may leave a mathematics activity temporarily for some other purpose. For example, a student may sharpen a pencil during an ongoing mathematics activity. This is coded as off-task even when the teacher tells the student (overtly) that he/she may sharpen a pencil.

Level of Engagement*

(Level of Engagement is coded only when the student is coded as Engaged.)

S = Process

Engagement at the process level requires that the student be working on something that requires him/her to integrate facts or to show knowledge of their interrelationships. This level is generally

*See Appendix Three for additional discussion.

in response to a "how?" or "why?" question.

T = Product

Engagement at the product level requires that the student know a specific fact but does not require that the student integrate several facts or make inferences from them.

The process level is the most complex level of engagement. In it, the student is required to integrate facts or to show knowledge of their interrelationships. It most frequently is an activity that asks "why?" or "how?" A process activity requires the student to specify the cognitive and/or behavioral steps that must be gone through in order to solve a problem or come up with an answer.

The answer in a product activity can usually be expressed in a single word or a short phrase. Product activities differ from process activities in that they only require knowledge of a specific fact and do not force the student to integrate several facts or to make inferences from them.

Spatial Engagement

(Spatial Engagement is coded only when the student is coded as Engaged.)

SV = Spatial

The target student is coded as engaged in a spatial activity when it is apparent that she/he is using spatial visualization or is drawing a picture to aid in solving a problem or in understanding a mathematical concept.

NS = Non-Spatial

The target student is coded as engaged in a non-spatial activity (NS) when he/she does not appear to be using spatial visualization or a picture to aid in learning mathematics.

Peer Interaction

(Peer Interaction is coded only when the student is coded as Engaged.)

P = Peer Interaction

A target student is coded as interacting with a peer (P) when he/she is working on some mathematical concept or problem with one or more peers.

NP = No Peer Interaction

The target student is not interacting with peers (NP).

Teacher and Student Location

The first time the observers works in a classroom, she/he will make a sketch of the classroom. The classroom layout sketch should include the teacher's desk(s) and the arrangement of the student desks and work tables. Copies of this sketch will be provided for the observer to use in subsequent observations.

At the end of each observation session, the coder records the location where the teacher spent the majority of the class period. In addition, the coder records the location where each target student spent the majority of the period. This is done by sketching the classroom seating chart on the extra sheet provided for engaged time observer comments.

Data Collection Procedures

Data from the engaged time observation system are recorded on the Engaged Time coding sheet while the observer is in the classroom. One coding sheet is used for each day of observation. The coding sheet contains space for data from a maximum of 13 students and space for identifying the observer, day and teacher. Each student block consists of an I.D. region and a region for observation data. Each student is identified by a unique two-digit number marked in the I.D. region. It is not necessary for a particular student's data to be recorded in the same student block each day. The decision of which student's data are recorded in which block should be based on student location in relation to other target students. During classroom observation the observer attaches the coding sheet to a clipboard. Unlike the Teacher-Student Interaction coding sheet, the categories are printed directly on the Engaged Time coding sheet. Thus, no coding guide is necessary.

During observation it is important that accurate data are collected and that students and teacher do not receive cues to indicate which students are being observed. In order to get accurate data the observer must be close enough to see whether or not the student is working on mathematics and if so, the type of learning activity in which the student is involved. At the same time the observer must use techniques to disguise which students he/she is observing. The observer should avoid eye contact with target students. In addition, the observer should act as though she/he is observing non-target students. Observers should be as unobtrusive as possible and should affect the classroom environment and

behavior as little as possible. The degree to which observers may move around the classroom is a matter of judgment. If the students' or teacher's behavior appears to be influenced by the presence of the observer, it is often advisable for the observer to remain in one place. Also, if the teacher and students seem uncomfortable with observers in the classroom, the observers should not communicate with each other.

A few minutes before the beginning of each class to be observed, the observer fills in the observer, day, teacher, and target student identification numbers. The observer writes the numbers in the appropriate boxes and darkens the circles below the boxes. Each circle should be darkened with a number 2 pencil. All marks should be dark, should not extend outside the circle boundaries, and should fill the circle to be darkened. If an error is made, the incorrect mark should be erased completely. No marks should be made on the coding sheet other than writing in the identification numbers, darkening the circles for these numbers, and darkening circles for the data. Both before and after data collection, the coding sheets should be transported carefully. If a sheet is folded, torn, or wrinkled, or has its edges bent, the sheet must be recopied since the scanner will not read a damaged sheet.

In addition to the coding sheet, the observer fills out an Observer Comment sheet daily. The Observer Comment sheet is used to indicate student seat location, teacher location, comments about the behavior of target students, and any unusual classroom events.

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Romberg, T., Small, M., Carnahan, R., & Cookson, C. Observer's Manual, Coordinated Study #1, 1978-1980. Wisconsin Research and Development Center for Individualized Schooling, Madison, WI, 1980.

APPENDIX ONE

Teacher Student Interaction -- Quick Reference Outline

Public Interactions

Public Interactions	Public interactions between the teacher and only one student at a time may occur in a large group or small group (2 or more students) setting. They occur when the teacher asks a question or makes a comment to which a target student is to respond and when a target student asks the teacher a question and the teacher responds.
Student-Initiated	Public interaction initiated by a target student.
Discipline	This is a question asked by the teacher in a public setting. Teacher gives some indication that the question is asked to compel the target to pay attention.
Direct-No Volunteer	Teacher calls on a target student who has not volunteered.
Open-Volunteer	Teacher asks a question and calls on a target student who has volunteered to respond to the question. Or, student raises hand, is called on, and initiates an interaction.
Call-Out	A target student calls out the answer to a question before the teacher has a chance to call on anyone. The teacher responds to the student who has called out the response. Or, the student initiates an interaction by calling out.

Level of Questions

Process	This is a mathematics interaction in which the target student goes beyond recall. It is generally a "why?" question or deals with a word problem.

Product	A product interaction is one which requires the target student to answer with a single word or phrase without going beyond simple computation or recall.
Non-Mathematics	In such an interaction the target student does not show skill or knowledge of mathematics. The teacher does not evaluate the student response as correct or incorrect.

Student's Answer

Correct	Student's answer is considered correct unless the teacher makes some action suggesting dissatisfaction with it.
Part Correct	Teacher indicates that target student's answer is correct but incomplete, or that the response is correct but not the answer the teacher is seeking.
Incorrect	Teacher indicates that the target student's answer is wrong by saying so, providing the correct answer, or asking someone else.
No Response	Student indicates that he/she cannot answer the question or student remains silent.

Teacher's Feedback

Positive Feedback	As feedback, the teacher compliments the target student or makes a gesture indicating warmth or excitement. Also includes teacher feedback which indicates that the student's response was correct. (Examples: Good, Fine, Wonderful, That's right, Yes)
Neutral Feedback	Teacher makes no response whatsoever to target student's response, or teacher continues without indicating whether student's response was correct or incorrect. In a Student-Initiated interaction this means the teacher responded to the student without praise or criticism.

Negative Feedback	The teacher provides impersonal feedback that the target student's response is not correct, or the teacher expresses personal criticism or anger.
Sustaining Feedback	The teacher attempts to stay with a target student so that he/she can answer the question asked. It may consist of repeating the original question, rephrasing the original question, giving some type of clue, or asking a new question.
Sustaining Feedback (Coding Instructions)	Whenever sustaining feedback is coded, the coder skips to the next line to code student number, the level of the question, the target student's response, and the nature of further feedback given by the teacher. If further sustaining feedback is given to this second response opportunity, the coder once again skips to the next line and codes student number, the level of the question, student response and teacher feedback.

Teacher Comments

Confidence - Positive	Teacher comments that the target student is confident in her/his ability to do mathematics.
Confidence - Negative	Teacher comments that the target student is low in her/his confidence in mathematics.
Confidence - Neutral	Teacher comments about target student's confidence without making a positive or negative comment.
Usefulness - Positive	Teacher says that mathematics will be useful for the target student.
Usefulness - Negative	Teacher says that mathematics or the particular topic under consideration will <u>not</u> be useful for the target student.
Stereotyping - Positive	Teacher comment to a target student saying that mathematics is equally appropriate for males and females, that mathematics ought to be free of sex stereotyping or that females are better at mathematics than are males.

Stereotyping - Negative	Teacher comments to a target student that mathematics is not appropriate as a subject of study for females, or that males are more suited to the study of mathematics than are females.
Enjoyment - Positive	Teacher states that the target student enjoys or likes mathematics.
Enjoyment - Negative	Teacher states that the target student dislikes mathematics or does not enjoy some aspect of mathematics.
Enjoyment - Neutral	Teacher comments that a target student neither likes nor dislikes math.
Expectations - Positive	Teacher tells a target student that he/she will probably do well in mathematics or school.
Expectations - Negative	Teacher tells a target student that she/he will probably not be very successful in mathematics or school.
Attribution	Teacher attributes a target student's success or failure in mathematics to ability, effort, the difficulty of the task, or the learning environment.

Non-Public Teacher-Student Interactions

Student-Initiated	This is a private contact between target student and teacher that is initiated by the target student.
Teacher-Initiated	This is a private contact between the target student and the teacher which is initiated by the teacher.
Work-Related	This is a teacher student-teacher contact concerning the target student's seat work, homework, clarification of directions, or feedback about already completed work.
Procedural	The target student requests permission to do something or requests information about how to take care of his/her own special needs. Or the teacher approaches a target student to ask him/her to run an errand,

pass out equipment or otherwise help with class management. The contact whether teacher-initiated or student-initiated is to take care of a situation idiosyncratic to the target student involved.

Behavioral Interactions

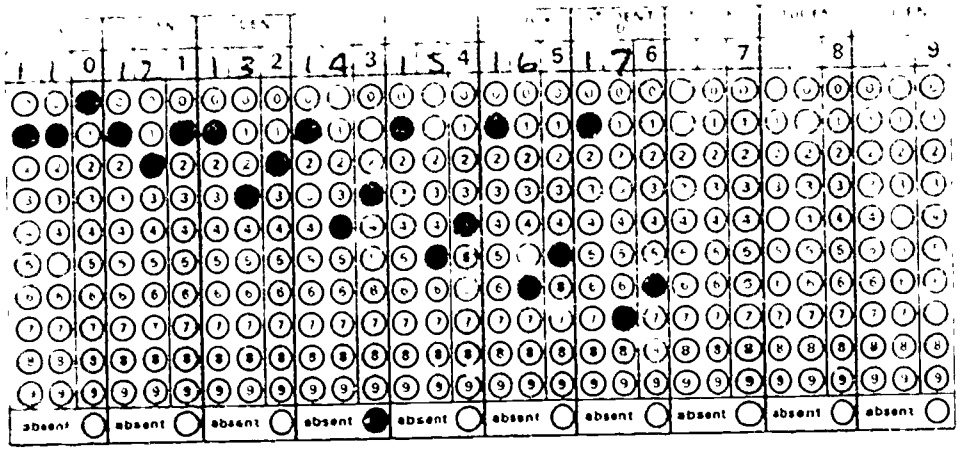
Behavioral

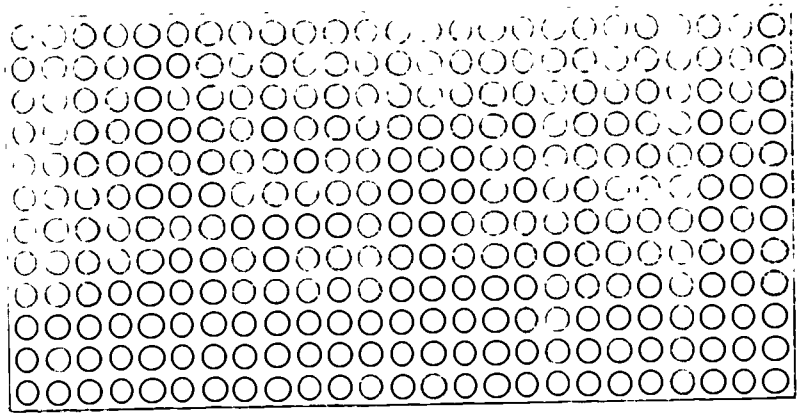
This is a Teacher-Initiated interaction (Public or Non-Public) in which the teacher comments upon the target student's classroom behavior. The teacher singles out the target student for comment on his/her classroom behavior. The interaction is concerned with the target student's behavior and does not involve praise or criticism in connection with Work-Related or Procedural contacts.

'EACHER STUDENT

NTERACTION

64





STUDENT NUMBER

PUBLIC

NON-PUBLIC

APPENDIX TWO

Engaged Time -- Quick Reference Outline

Absent = A	Target student is absent during the observation period.
Engaged = E	The target student is engaged in a learning activity related to mathematics content.
Off-Task = 0	Off-task describes the target student when she/he is not engaged in a mathematics learning activity.
Process = S	A process level of engagement requires the target student to integrate facts or show knowledge of interrelationships among facts.
Product = T	A product level of engagement only requires that the target student know a specific fact.
Spatial = SV	Spatial engagement is coded when the target student uses a figure or drawing to aid in solving a mathematics problem.
Non-Spatial = NS	Non-spatial engagement occurs when the target student is engaged in a mathematics learning activity but is not using a figure or drawing to aid in understanding the mathematics or solving the problem.
Peer Interaction = P	A target student is coded as interacting with a peer when she/he is working on some mathematical concept or problem with one or more peers.
No Peer Interaction = NP	The target student is engaged but not interacting with a peer or peers.

APPENDIX THREE

Process/Product: Additional Notes

1. In simple terms: Process = Thinking
   Product = Recalling

2. In the time-sampled observations, code the target student on the basis of the class's level of engagement; i.e., if the class is in Process (S) mode, assume the target student is also.

3. The level of engagement, (S) or (T), is dependent on the student's cognitive level; i.e., Product (T) for the observer could be Process (S) for the student.

4. Clues:

Product (T)	Process (S)
"What's the answer?"	"Why is the problem done this way?"
computation	story problems (sometimes Product too)
using an algorithm	non-routine problems
listing the steps of an algorithm	showing insight or deeper understanding
checking homework or test answers	looking for a pattern
practicing	starting a new topic
	developing a concept or formula

5. Examples:

Product (T)	Process (S)
What is 10 2 ?	Why are these the same?
What is 10 X 1/2 ?	What do you notice about these problems?
What is 18 6 ?	What do you think the reciprocal is?
What is 18 X 1/6 ?	What might a formula or rule be for dividing by fractions?
Now try these problems:	

APPENDIX FOUR

Data Collection Procedure

I.D. STUDENT 1

I.D. STUDENT 2

I.D STUDENT 3

I.D. STUDENT 4

I.D. STUDENT 5

I.D. STUDENT 6

I.D. STUDENT 7

I.D. STUDENT 8

I.D. STUDENT 9

I.D. STUDENT 10

I.D. STUDENT 11

I.D. STUDENT 12

I.D. STUDENT 13

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IF FOUND, PLEASE RETURN TO: ELIZABETH FENNEMA, TEACHER EDUCATION BUILDING, UW-MADISON.

ENGAGED

TIME

OBSERVER

DAY

TEACHER

TEACHER — STUDENT INTERACTION

69

OBSERVER

DAY

TEACHER

STUDENT ID 0 1 2 3 4 5 6 7 8 9

absent

STUDENT NUMBER	PUBLIC														NON-PUBLIC										
	Student Initiated	Discipline	Direct-No. Volunteer	Open-Volunteer	Call Out	Process	Product	Non-Academic	Correct	Part Correct	Incorrect	No Response	Positive	Neutral	Negative	All Sustaining	S-A	S-EF	S-I	S-EN	F-A	F-EF	F-I	F-EN	Praise	Process	Product	Criticism	Don't Know	Praise	Neutral	Criticism	Praise	Process	Product	Criticism	Don't Know	Procedural	Praise	Criticism
		Response Oppor.				Level of Question			Student's Answer				Feedback				Teacher Comments								Student-Created Contact								Teacher-Created Contact							
													Terminal												Work					Proc.			Work					Behavior		

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