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ABSTRACT

A 3-year study was undertaken to identify the salient features of verbal academic (math and science) language performance of third- and sixth-grade students. The investigation classified both native and nonnative English-speaking students as either effective communicators/responders or unsuccessful communicators/responders. The study examined teacher-student communication during "verification of learning" activities, lesson segments in which the teacher checks student learning through one or more series of topic-related question-response-evaluation exchanges. Data collection took place in two Virginia public schools with high concentrations of ethnic and minority populations. The study report contains three parts. The first part outlines the study's methodology for analyzing the topical and functional aspects of the verbal interactive work of the teachers and students. The second presents the results of interviews eliciting students' and teachers' understanding of the function and process of verification of learning activities. The third examines the more specific linguistic and interactional characteristics of the turns-at-talk within each interactive task under consideration. (MSE)

Academic Language Talk:
Significant Features in the Responses
of L1/L2 "Effective Communicators"

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May, 1988

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CONTENTS

*This report is presented in draft form, because funding for this project, orignally scheduled to end in August, 1988, was unexpectedly withdrawn as of May 31, 1988.

MATH AND SCIENCE VERIFICATION OF LEARNING ACTIVITIES: ANALYZING THE VERBAL INTERACTIVE WORK OF TEACHERS AND STUDENTS

1. Analyzing Classroom Conversation: A Review of the Literature.

Classroom conversation is a form of social interaction, as is conversation in other social settings (Goffman, 1971). Its structure is determined by a series of conversational engagement rules (turn-taking, etc: Sacks, et al., 1974) modified to accommodate differences in status relationships between the conversationalists and the pedagogical goals of the lesson where the interaction occurs (Edwards & Furlong, 1979).

Analysis of classroom communicative behavior has focused mostly on the nature of teachers' questions, their function, and their effects on students' responses and learning (Dillon, 1984; Gall, 1984; Brophy, 1986; among others). The analysis of face-to-face academic verbal interaction between teachers and students cannot be fully understood when teachers' questions and students' responses are only described in isolation.

A good example of the dynamic--yet structured--nature of classroom verbal interaction is given here:

Teacher: ...What do we do, then..What's the next thing...What do we add.

Student: Look at the fractions next.....You add the,

um the one and

and the one

Teacher:		What do...
		....Okay And can I do that? What's one and one?
Student:	Yeah.....	.....Two
Teacher:		Okay...so you see, you can add it even though they're the same number...

This short segment is developed around the question, "...what do we add [next]?" First of all, the intention of the teacher's request for factual information cannot be fully understood except within the context of the larger lesson activity, which in this case was a math review activity. Second, the "answer" is obviously co-constructed between the teacher (who coaches and positively evaluates the student) and the student, in a series of question-response-evaluation segments. The student's "follow-up" responses at times overlap with those of the teacher without breaking the rules of conversational engagement (Sacks et al., 1974).

This example illustrates that classroom verbal interaction constitutes a special discourse genre requiring an "interactional unit" to fully describe the process of creating meaning through interaction as participants strive to meet pedagogical goals. An interactional approach to discourse analysis recognizes that behavior is influenced not only by the immediately prior stimulus, but that observed behavior is also "a function of the interconnected behaviors that retrospectively precede it in time

and those that are prospectively possible" (Mehan, 1979:77). This approach recognizes that participants influence each others' behavior reciprocally, with students' behaviors influencing the teacher just as the teachers' behaviors influence the students' interactive replies. The notion of an interactional unit to describe and analyze classroom interaction counters the mistaken assumption underlying much social research on teaching "that causation in classrooms operates unilaterally from the teacher to the students" (Bolster, 1983:297, in Simich, 1984:227) and that "the reciprocal effects of students on teachers or of students on students...are thought to be either non-existent or not of central consequence" (Ibid).

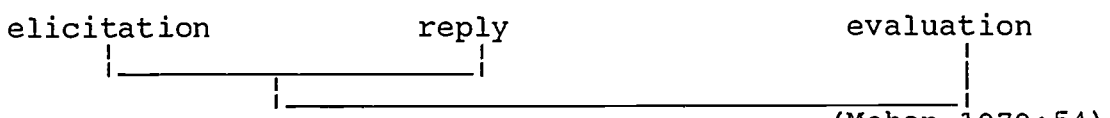
What follows is a review of those approaches to defining interactional units of communication which have influenced our work.

"Statements" and "Replies"

The need to describe and interpret conversation in general--and classroom conversation specifically--as social interaction has been considered by sociologists of language and linguists. Goffman (1981) describes conversation as comprised of function-based units which he terms "moves." Goffman recognizes moves of two kinds. "Statements" are moves characterized by an orientation to some sort of answering to follow. "Replies," which are complementary to statements, "can be seen as an answering of some kind to a preceding matter that has been raised" (Goffman, 1981:24).

"Elicitation Acts" and "Topically-related" Sets

Mehan (1979), in a descriptive study of a first grade classroom, uses two types of "social acts" to analyze teacher and student verbal interaction: "elicitation acts" and "topically-related sets." Unlike conversation in other social settings (Schegloff, 1977), these acts (minimally) consist of a 3-part exchange: a teacher's inquiry, the student's reply, and the teacher's evaluation. These social acts function because of the participants' joint collaboration. However, because of the unequal status of the participants, it is the teacher who effectively controls the nature and scope of classroom interaction. (Edwards and Furlong, 1979). Schegloff's work on conversational rules suggests there is a principle of conditional relevance between all two-part sequential conversational exchanges (1977, in Griffin and Humphrey, 1978), which he terms the adjacency pair principle. Mehan (1979) explains how the adjacency pair principle also applies to the 3-part exchange that characterizes teacher-student verbal interaction. He treats the initial teacher elicitation AND student response as the first adjacency pair. The second part of this pair is the teacher's evaluation of the student's answer:



(Mehan 1979:54)

Even though there is no agreement about the validity of Mehan's interpretation (Griffin & Humphrey, 1978:68), there is agreement

that the 3-part elicitation act constitutes a pedagogical and functional unit. Mehan identifies four categories of teachers' inquiries which he terms elicitation acts. These include: 1) "choice elicitations," calling on students to agree or disagree with the statement provided by the teacher or to choose one of a set of alternatives. In either case the elicitation itself contains the information that the student needs in order to reply; 2) "product elicitations," where the respondent must provide a factual response; 3) "process elicitations," where the student is asked for an opinion or interpretation; and 4) "metaprocess elicitations," which ask students to formulate the grounds of their reasoning. Teachers' strategies to maintain the sequence of interaction leading to the evaluation include prompting, re-casting, and/or simplifying the elicitation, among others.

The "social acts," or elicitation sequences, are organized into units Mehan calls "topically related sets." The beginning and end of a topically-related set is marked interactionally by an orientational shift (to different instructional activities or materials), and linguistically "by the appearance of a closed set of verbal forms that appear in no other places in the lessons." These are discourse markers [formulas], hesitations, intonation and postural changes, etc. The instructional topic of the lesson is accomplished with "basic sequences" and "conditional sequences" which further develop the topic. The basic and conditional sequences blend into one interactional unit (68).

The "Communicative Task" and the "Interactional Episode"

Gumperz, Kaltman, and O'Connor (1984) suggest a unit of analysis they call a "communicative task." A given type of communicative task is characterized by its own particular "recurrent, general interactive intention" (p. 9). Examples of types of communicative tasks, which differ from one another according to their function, are narrating, describing, explaining, emphasizing, justifying, arguing, and expressing feelings. Cook-Gumperz and Corsaro (1977) identify a similar unit of analysis called an "interactive episode." They relate this unit to Goffman's (1963) concept of "encounter" and "face engagement," a mutual activity maintained through participants' joint "focus of cognitive and visual attention...entailing preferential communication rights" (Goffman 1963:89, quoted in Cook-Gumperz and Corsaro 1977:13). Cook-Gumperz and Corsaro extend Goffman's concept of face engagement as it applies to children's communication in a nursery situation, which is the object of their study. They note that "episodes begin only when children go beyond mutual acknowledgement and initiate or propose some mode of activity of definition of the situation which serves as the beginnings of mutual activity" (Ibid:13-14). "Episodes end with physical movement of interactants from the area which results in the termination of the originally initiated activity" (Ibid:15).

"Interactive Tasks" Comprising Verification of Learning Activities

Simich (1984) conducted a descriptive case study of the sociolinguistic structure of science and art lessons in a multicultural sixth-grade classroom where English was the language of instruction. One of her research goals was to identify discourse and interactive strategies used by the teacher and her students when verifying (from the teacher's perspective) and conveying (from the student's perspective) academic knowledge verbally in math and art lessons. She called these verbal review lesson segments "Verification of Learning Activities" (VOLs) (Simich, 1984:151). The unit of analysis was the "interactive task" (IT), which she described as

> a conversational exchange between the teacher and a student where a cooperative effort from the participants is essential for the successful initiation, maintenance, and resolution of the task. (1984:143)

The concept of the Interactive Task is thus essentially a modification of the notions of the "communicative task" (Gumperz, Kaltman, and O'Connor, 1984) and the 'interactive episode" (Cook-Gumperz and Corsaro, 1977). Simich synthesized these concepts and applied the resulting unit to the analysis of verbal interaction during academic VOL activities. Unlike verbal interaction in other social settings, the function and topic of the IT is established by the teacher, who initiates the interaction and can end it at will. However, for VOL Interactive Tasks to succeed, both the teacher and the students must share an understanding of intent and topic, which in turn means they have to share cultural, situational, and content knowledge (Gumperz, 1982 a,b).

Simich chose the "Interactive Task" as the unit of analysis to document the dynamic nature of VOL teacher-student discourse and the nature of their communicative repertoire, including but not confined to speech. Mehan (1979;--) notes that the actual teacher/student exchange "is not known until the entire sequence is completed," making it clear that it is in the interaction between teachers and students that "Interactive Tasks" are brought to successful resolutions. The purpose of interactive analysis is "to isolate similar tasks and compare the ways in which various students and the teacher signal that they are performing those tasks" (Mehan 1979:144).

Summary of Methodology

Initial findings from Simich's work provided the initial impetus to expand our understanding of academic language proficiency and how it is displayed in classroom verbal communication, with particular relevance to the participation of limited- English-proficient (LEP) students in math and science verbal interaction.

Funds from the Office of Educational Research and Improvement, U.S. Education Department, helped to launch a three year study whose main goal is the identification of salient features of the verbal academic (math and science) language performance of both third and sixth grade students. These students are native and non-native English speaking and are considered "effective communicators/responders" or "unsuccessful communicators/ responders." We examined teacher-student

communication during Verification of Learning activities, or lesson segments when the teacher checks student learning through one or more series of topic-related questions-response-evaluation exchanges. Each series is termed an "interactive task" (Simich: 1984). Effective communication skills are crucial for language minority students in these contexts, since teachers evaluate how much students have learned in part by how well (in the teacher's perception) they verbally communicate their knowledge.

Collaborating teachers in Fairfax County, VA (three 6th grade and four 3rd grade teachers) identified the subjects for classroom observation and videotaping, selecting students at the extremes of a continuum: on one extreme, the "effective responders," whose responses during VOLs ir math and science lessons were considered to be dependably good, and on the other extreme, the "unsuccessful responders," whose responses during these VOLs were deemed consistently lacking. Three types of data were collected: 1) systematic observations of science and math lessons during a period of 8 months; 2) interviews with participating teachers and students and a follow-up teacher questionnaire to elicit their metacognition about salient features of successful VOLs; and 3) videotapes of teachers engaging in math and science VOLs with subject students.

Target Students/Teachers:

Data collection took place in two public elementary schools in Fairfax County, Virginia, which were chosen for their relatively high concentrations of ethnic and language-minority

students. Permission to conduct classroom research was granted by the Department of Instructional Services, Office of Research and Evaluation of the Fairfax County Public Schools, on February 20, 1986. In early March, 1986, the researchers met with the principals and teachers at Parklawn and Belvedere elementary schools to ask third and sixth grade teachers to volunteer to participate in the study. The third and sixth grades were chosen because from the third grade on, students are gradually introduced to more structured and demanding math and science curricula which emphasize the development of reasoning and problem-solving skills. In addition, by the time students reach the sixth grade, there should be a noticeable change in their linguistic, social and cognitive development. By studying and comparing L1/L2 students at the third and sixth grade levels, we can document differential growth in language skills related to academic verbal performance.

Seven teachers (four third grade, three sixth grade) elected to participate in this study. One of the third grade and one of the sixth grade teachers teach only students identified by the district as "Gifted and Talented."[1] Each teacher was asked to identify (for interview, classroom observational, and videotaping purposes) two groups of students: the "effective responders/communicators", or "er's", whose responses during math and science VOLs the teacher would consistently accept; and the

[1] The Gifted and Talented sub-sample came about purely coincidentally as part of the school to which the district assigned this project.

"unsuccessful responders/communicators", or "ur's", whose responses during math and science VOLs the teacher would find consistently lacking.

Although the central and basic criterion for the selection of student subjects was the teacher's designation of verbal communicative effectiveness in conveying academic knowledge, the inclusion of non-native English speakers was encouraged. Teachers were told that a major outcome of the study would be practical information on teachers' and students' standards for successful classroom communication, which would be especially useful to teachers of LEP (Limited English Proficient) students who had recently exited from English as a Second Language classes and were trying to adjust to the mainstream classroom. Teachers were asked to keep this in mind, and, in making their subject selections, to be sure not to overlook any non-native English speaking students who would validly fall into either the er or ur category. Teachers were told that all non-native English speakers in the study should have previously received ESL instruction but be currently exited from the program (exit is contingent on achieving a district-specified percentage in the district-developed language proficiency test). These students were therefore considered by the district to have the necessary English language skills to benefit from educational opportunities as well as their native English-speaking peers.

The teachers are more than subjects of observation in this study: they are knowledgeable insiders, and their role is

collaborative. This study has taken as a starting point the teachers' perceptions of students' abilities to convey knowledge during VOLs because teachers' evaluations of how well students communicate their knowledge has a major impact on students' academic success. Differential teachers' perceptions of students' social behaviors that facilitate learning, at different age levels, have been documented (Humphrey, 1979; Simich, 1984). Teachers were later asked to state the criteria they used in er/ur designation.

For the 1985-86 school year, 64 students were identified to participate: 27 sixth graders (17 "er's," 10 "ur's") and 37 third graders (19 "er's," 18 "ur's"). Table 1 shows the distribution of these students, with almost half of the third grade students being LEP, while the sixth grade presented a more heavily native-speaking population. Boys and girls are almost evenly represented, with slightly more boys participating at the third grade level. GT students represented about 32% of the third grade students and about 30% of the sixth grade students.

As the study moved into its second year, a decision had to be made whether to continue the study with the same students who had been observed and interviewed during the spring of 1986, requiring the recruitment of new teachers to participate in the study, versus remaining with the same teachers and working with a new group of students in the observations and videotaping during the 1986-87 school year. Because of the good working relationships developed during the first year, and because this

study was more interested in the process of classroom interaction rather than the analysis of the language of specific students, the decision was made to continue the study with the same teachers.

For the 1986-87 school year, then, 66 students were identified to participate: 21 sixth graders (11 "er's," 10 "ur's") and 45 third graders (28 "er's," 17 "ur's"). Table 2 shows the distribution of these students, with about 27% of the third grade and 19% of the sixth grade students being LEP. Boys are more heavily represented than girls at the third grade level, while boys and girls are evenly represented at the sixth grade level. GT students represented about 31% of the third grade students and about 43% of the sixth grade students.

Table 1

Participating Students, 1985-86 School Year

	Grade Level					
	3rd			6th		
	er's	ur's	Total	er's	ur's	Total
All students	9	18	37	17	10	27
L1 English	10	10	20	15	9	24
L2 English	9	8	17	2	1	3
GT students	6	6	12	4	4	8
Boys	9	12	21	7	6	13
Girls	10	6	16	10	4	14

Table 2

Participating Students, 1986-87 School Year

	Grade Level					
	3rd			6th		
	er's	ur's	Total	er's	ur's	Total
All students	28	17	45	11	10	21
L1 English	21	12	33	9	8	17
L2 English	7	5	12	2	2	4
GT students	8	6	14	5	4	9
Boys	18	9	27	5	5	10
Girls	10	8	18	6	5	11

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Analysis of the metacognitive data has yielded a set of features of "good" responses, organized along dimensions of cognitive, interactional, and linguistic characteristics. This metacognitive information forms the basis for the analysis of the discourse and interaction of actual classroom interaction (from the videotaped data). The metacognitive findings are reported in Chapter 2.

This paper focuses on an analysis of the interactive work performed by the seven participating teachers and their selected students in the negotiation and development of academic topics during math/science, 3rd and 6th grade VOLs. We attempt to show the relationship between the teachers' "pedagogical goals" (which are mostly determined by the curriculum content and methodology) and the functional language options available--and used by them--to elicit students' replies . Key research questions are:

- How do teachers verify students' knowledge during math/science VOLs?
- What is the function of the VOL/ITs?
- What communicative means are available--and used--by the teacher and the students?
- How are "repairs" made when the teacher and student(s) are deadlocked and the VOL/IT cannot be resolved?
- What functional language knowledge is needed by the following groups to successfully participate in verbal VOLs: 3rd vs 6th graders, native vs. non-native student speakers of English; students identified by their teachers as "unsuccessful" vs. "successful" communicators/responders.

The unit of analysis is the Interactive Task (IT). We define the VOL/IT as a conversational exchange between the teacher and

student(s) which has two complementary purposes: for the teacher to verify students' learning and for the students to convey knowledge or "old information."

"Verifying Learning" as a Distinct Pedagogical Activity

The pedagogical imperative of verifying students' learning is related to the basic tenants underlying learning theory as applied to teaching and teacher training. Teachers are taught to organize their lesson plans to teach, evaluate, and re-teach, in that order.[2] Simich's (1984) case study of a 6th grade classroom described segmentation of lessons into different activities which closely follow the "teach, evaluate, and re-teach" cycle.[3] Simich identified four sequentially ordered lesson activities which had distinct pedagogical and sociolinguistic rules of interaction. These are "Getting Ready," "Giving Instruction," "Verifying Learning," and "Cleaning Up." These activities almost always occurred in sequential order, with some variability in the position of the Verifying Learning activity. At times, the teacher verified students' understanding and learning before she started instruction--i.e., sharing new information with the

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[2]This differs from Mehan's (1979) description of lesson organization in a kindergarten classroom, in which he suggests that lessons are organized in three phases: opening, instructional, and closing. He describes the instructional phase as "the heart of the lesson" (Ibid:36) and the time when "academic information is exchanged between teachers and students" (Ibid:36). Evaluation activities, in Mehan's description, take place during the instructional cycle.

[3]To be created...

students. At other times, the teacher verified knowledge before and after the instructional time. The teacher engaged in "question/answer" verbal interaction at different times during the lesson and for different purposes. Question/answer periods occurred mostly during "Giving Instruction" and "Verifying Learning" activities (Simich: 1984). Other activities during lessons, such as transitional activities between lessons were predominately characterized by teacher directives (e.g., put things away, get ready for the next lesson, etc.). During instructional time, the teacher introduced "new information" by lecturing and/or asking students a series of "exploratory questions" whose purpose was to actively engage students in the "discovery" of concepts and skills. Table 3 describes segmentation of math/ science lessons into activities, each one having specific pedagogical, linguistic, and functional characteristics.

Table 3

Lesson Activities and their Pedagogical, Linguistic and Functional Dimensions

Initiation (Getting Ready)	
Pedagogical function:	To orient student attention to the forthcoming instructional activity
Language functions:	Mostly directives (requests for action) and commands
Interactive work:	Face-to-face verbal ITs, mostly consisting of teacher requests and student responses in the form of complementary actions
Instructional (Giving Instruction)	
Pedagogical function:	To teach students concepts and skills called for in the math/science curriculum. Each curriculum unit consists of a major topic, e.g., addition, subtraction, multiplication, which is segmented into sub-topics organizing the content of instruction. During lessons, manageable and sequential components of the main topic are introduced by the teacher.
Language functions	Generally, the teacher lectures and the students are said to learn by showing appropriate attentive behavior and by "participating" in appropriate activities (e.g., opening the text when directed to do so, or copying information from the blackboard). An alternative to the "lecture" style is characterized by teachers' use of "contrived conversational sequences", or face-to-face verbal exchanges alone or in combination with short lectures that resemble VOL/ITs in terms of the language functions and interactive work performed. Educators call this alternative teaching style the "discovery approach." The main difference between these instructional

ITs and VOL/ITs is their primarily instructional function as opposed to the evaluative nature of VOLs.

For a partial list of language functions see Lucas and Borders, Inform/Respond functions (1987: 123).

Interactive Work: It varies from lecture type to face-to-face verbal IT, the latter being aimed at involving students in finding out (discovering) new concepts and skills (as was the case with the science experiments and "discussion" in classrooms we observed.)

Verification of Learning Activity

Pedagogical Function: To verify student knowledge of information already taught during the instructional activity. All VOLs have an evaluative function but their evaluative "intensity" varies along an continuum, from a "review" to an oral exam or quiz where students are evaluated for their content knowledge and verbal performance. VOLs are written, verbal, or both.

Language Functions: Examples of VOL functions are: define, describe, repeat, report, elaborate, extend, predict, etc. See Lucas and Borders (1987:123) for more examples of specific functions used during VOLs.

Interactive Work: During written VOLs the student interacts with written text. During face-to-face verbal interaction, the student interacts with the teacher.

Closing

Pedagogical Function: To terminate the instructional activity under way.

Language Functions: Mostly directions and commands.

Interactive Work: Fact to face verbal ITs mostly consisting of teacher's requests for action and students' responses.

The importance of evaluation in pedagogical theory and descriptive studies, including our own, which verify the existence of verification of learning activities, justifies considering VOLs as an additional phase in lesson cycle.

The Function and Structure of the VOL

We have defined VOLs as lesson activities whose pedagogical purpose is to verify student understanding and learning of previously taught information. Minimally, a VOL may consist of a single Interactive Task (IT) concerning a single pedagogical/language function. This is (normally) realized through a teacher-initiated inquiry followed by a student's complementary reply and closure through a teacher's evaluation move. This closure only occurs if the teacher's evaluation is non-negative. If it is negative, the 3-part Interactive Task will normally be expanded into several topically-related "follow-up" elicitations until a student response is accepted. The teacher marks closure with a positive evaluation. This is still a single VOL/IT though since the topic and task in the original inquiry are still being resolved in the extended interaction.

Teachers establish the direction of the verbal VOL, not only by choosing which students will respond to which elicitation, but also by their choices of pedagogical and language functions. It is these choices that shape students' response and allow him/her to display only those aspects of knowledge that the teacher wants to highlight.

VOLs can also be extended segments of verbal interaction consisting of several Interactive Tasks developed between the teacher and teacher-selected student(s). Whether any given VOL consists of one IT or several is an issue which is directly related to curriculum and lesson organization. Teachers segment knowledge following curriculum organization into topical "units of study" which normally consist of several sub-topics taught during one or more lessons. VOL scope reflects this segmentation, since teacher expectations and requirements for the level and type of learning after the first lesson of a curriculum unit will be far different from the pre-quiz VOL for the entire lesson or unit.

In order for a VOL to fulfill its function, some prerequisites need to be in place:

1. Teachers and students share knowledge about the language of instruction and the social conventions of VOLs (when and how to volunteer a response)
2. Teachers and students share situational knowledge about the nature and function of VOLs; they can answer the question, What is going on here? (McDermitt, 1976:6). The students need to be aware that they are engaging in a "verbal review" so that the teacher can check how much they have learned, rather than asking questions about material that is about to be taught, as way of getting students' attention, or determining their background knowledge of a new topic.

3. The students can be presumed to have gained a knowledge base (information about concepts from the lesson material to be dealt with in the VOL.
4. Teachers and students share a larger "world view" on which they must rely to successfully expand their knowledge base
5. Teachers and students are willing to cooperate with each other in order to fulfill the purpose of the VOL activity.

VOL activities have three components: "framing," IT sequences, and closing. The teacher controls the interaction and initiates it by "framing" it; that is, by orienting the students to the VOL activity by stating the goal and scope of the VOL. It is during this brief period that the teacher shares with the students his or her pedagogical "blueprint" for the VOL activity. "Framing" helps students to interpret the teacher's ongoing and changing meanings and guide their expectations about where they are going. It is this "framing" period that clarifies the roles and responsibilities of participants and the nature and scope of the VOL, including the degree of evaluative intensity to be expected (e.g., a review or an oral quiz). Once a VOL "frame" has been established, teachers make the transition to specific ITs by using markers of transition (from surface to semantic to prosodic and interactional), and, again, by "framing" the individual IT. It is when teachers omit the important "framing" (at the VOL and IT levels) and the signals of transition between

inquiries which guide the students to understand where the teacher is taking them, that miscommunication can occur.

VOL segments vary in the manner in which teachers signal the activity. VOL inquiries are marked both verbally and interactionally by the teacher: s/he might refer to information presented "last week," "yesterday," etc. In the example below, the teacher signals that this is a VOL rather than an exploratory inquiry/reply activity by using the word "test." It signalled that students are responsible for the specific knowledge to be covered during the VOL (Simich, 1984: 267):

T: Shhh! Now, what we have first of all. Hey Jeff, good stopping. Looking at page 10, under the "Activities and Procedures," page 10. April, super, you are doing a great job. Jennifer, good. Wendy, fine. Wendy, would you read the procedures for us?

W: (Reads the procedures.)

T: If I asked you, a question, on the test, about profile, raise your hands if you can define profile, a definition of profile, Willie?

Teachers signal that the VOL activity has started through verbal and interactional moves. They signal "transition time" by directing students to complete certain actions and foregrounding the purpose of the upcoming activity (the particular VOL) by stating their intentions and (ideally) the nature and scope of the verification of learning activity. This is done by highlighting the content (topic or sub-topics) to be reviewed and, at times, by including additional background information that helps students get a clear understanding of the purpose of the VOL. Prosodic markers are also used to mark the point of

informational focus within VOL Interactive Tasks (Gumperz, 1982 a,b). Several examples of VOL openings from our database follow.[4]

(Segment 2: Kraft/math--3rd grade)

T: (1) Our first objective is to practice the multiply-add sequence. (2) If you can get the multiply-add sequence, you will be able to do the very hard multiplication problems using your tables. (3) The first question I want to ask you is: What is a sequence? What does "sequence" mean? What do you think, Kendra?

In this example, the teacher foregrounds the general purpose of the VOL (1). The teacher relates the importance of this VOL to student ability to "do the very hard multiplication problems..." She signals that the purpose of the VOL is to evaluate student preparation for a future written VOL activity, and as such, that this is a review of material previously studied.

(Segment 1: Naidorf/science--3rd grade)

T: (1) All right, now we've been going over vocabulary and I have a little game that I want us to play. (2) So if you would just put your graphs right back on your trays. If you put your graphs back on your trays and push it back where it was so you'll have enough room. [The teacher continues to give directives...] (3) And this will give us a quick review of some of the vocabulary we're using as we work with sink and float objects [more directives...] (4) OK everybody, let's see if we can get "prediction" first. What does "prediction" really mean...

In her VOL introduction, the teacher highlights the on-going nature of the activity (1) and the purpose of this VOL (3) which signals the true purpose of this VOL: to determine to what extent the students have learned certain "vocabulary" concepts.

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[4]Prosodic markers are not included in these excerpts.

She signals transition time through directives and initiates the first VOL/IT (4).

(Segment 3: Sweat/science--6th grade)

T: (1) OK, why don't we go over question 2...question 3...OK um...(2) Simon, read what question 2 says.

It is common for verbal VOLs to develop as a further expansion of other homework, or written VOLs (i.e., seatwork). This teacher signals this continuity by stating that the VOL will cover "questions 2, question 3..." (1) and asking the student to "read what question 2 says" (2).

(Segment 4: Hartman/math--6th grade)

T: (1) What I'd like to do before we begin our lesson today is to review what we do when we have to add or subtract fractions. (2) Let's look at box 1: 7-1/8 minus 2-3/8. (3) What's the first thing you would do...if you had to...solve that problem. Soeka.

This teacher highlights the purpose of the VOL by explicitly stating its purpose and adding background information about the forthcoming instructional time. Then she initiates the first VOL/Interactive Task (3). See Appendix I for transcripts of selected math/science VOL/ITs.

The termination of VOL activities is generally marked with a series of directives that clearly indicate a change in the pedagogical and sociolinguistic structure of the situation. Here are some examples for transcripts of videotaped VOLs in our sample:

(Segment 1: Naidorf/6--Science)

T: ...OK, will you pick up your vocabulary cards, please, and put them together with the paper clip?

(Segment 7: Bowling/3--Science)

T: OK. Good thinking. Good work. You had some great ideas on how to make things float, and what makes them float, and that's what this is all about. OK. I want you to put all of these materials in...(end of segment)

The teachers in our sample marked most transactions--not just VOL openings/closing--with surface, semantic, and/or interactional markers.[5]

The benefit of VOL activities, from the student perspective, seems to be closely related to the ways in which teachers structure these activities, the topics they cover and the pedagogical purposes that are behind the language functions they jointly develop with the students. In other words, the kinds of questions teachers ask, both in terms of the content covered and their function.

What is the Function of Math and Science VOL/ITs?

The pedagogical function of the VOL/IT can be defined in terms of its function within the VOL and its function as an interactive unit. Each IT shares the larger VOL function which is to perform collaborative interactive work for the purpose of verifying (teacher) and conveying (student) knowledge. Individual ITs constitute individual interactive units, each developing topic-related elicitation under the large VOL content topic. Each IT is a socially constructed unit whose specific function is the co-construction of academic topic(s) in a manner

[5]For a detailed discourse analysis of selected math/science lessons in our sample, see Chapter 3.

in which the intentions of the conversationalists are carried out. Teacher elicitation "call for respondents to provide factual information, opinions, or interpretations of academic materials or provide the grounds of their [the respondents] reasoning when they reply" (Mehan, 1979:44). The teacher controls important aspects of the IT, principally, topic selection, scope, and student verbal participation. The student's principal responsibilities are to have knowledge of the specific IT content and to act upon the teacher elicitation.

Minimally, VOL/ITs consist of a three-part sequential interactive exchange between the teacher and a student; these moves have an obligatory co-occurrence relationship ("conditional relevance") like that found in the more common two-part sequential conversational exchanges found in most social setting (Schegloff 1977, in Griffing and Humphrey, 1978). Here is a typical example of a minimal IT; this interaction occurred in a third grade math lesson, in which the VOL topic was "the multiply-add sequence":

(Kraft:3)

T: Very good! you do one thing and then another. Have you ever put sentences in a story in sequence? When you put sentences in a story in sequence, how do you pout the sentences..Kendra?

Kendra: Um, like step by step?

T: Step by step! That's wonderful! All right! Now, the first thing we are going to practice in this sequence is which one...

This IT consists of three turns-at-talk. The IT, a request for exemplification of a factual-recall concept (the meaning of sequencing), is embedded in this 3-part verbal exchange. The first turn-at-talk includes a positive evaluation and short "summary" of the previous IT ("Very good! you do one thing and then another"). The closing of the previous IT is then followed by a yes/no question which serves to "frame" the IT, (to orient the students to the next topic), immediately followed by the IT opening "question" ("when you put sentences in a story in sequence, how do you put the sentence?") and an individual nomination ("Kendra?"). In Goffman's terms, this turn-at-talk consists of several statements clustered around two different "functional orientations" (or moves) (Goffman:24): to positively evaluate a previous student's response and to initiate a topic-related IT. The second turn-at-talk consists of one move: the student's response. The third turn-at-talk has the same "move structure" of the first teacher turn: it has two distinct functions. First, a positive evaluation of the IT ("step by step! that's wonderful! all right!") followed by the next IT signalled by a lexical marker: "now..."[6]

Mrs. Hartman:6 (Math VOL: steps in adding and subtracting mixed numbers)

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[6]Transcripts of selected math and science lessons provide evidence that even "minimal" ITs (consisting of initiation, reply, evaluation moves) are delivered within semantic environments which signal different meanings, as is the case above.

T: Excellent...good listening today. All right, what's our next step..Megan?

M: Um..look at um the whole numbers? subtract them?

T: Look at those whole numbers. And subtract them. How'd you know to subtract them, Megan?

M: 'Cause I looked at the sign?

T: Good.

The above is an example of an extended IT consisting of two sets of 3-part exchanges. The teacher initiates the IT during the first turn-at-talk ("...All right, what's our next step") and nominates Megan to respond. Megan responds ("Um..look at, um, the whole numbers? subtract them?") using rising intonation contours. the teacher repeats Megan's response overlapping her response and using lower intonation contours, signalling acceptance (positive evaluation). Rather than ending the IT, the teacher continues it by asking "How'd you know to subtract them, Megan?" Megan answers "'Cause I looked at the sign?" (note again her rising intonation) and the teacher gives a positive evaluation ('good') and ends this IT.

The above example shows that the teacher affects the VOL/IT topical development, maintains its progression, and terminates the interaction on each specific task by selecting from a range of IT "move-types." Different move-types are used to affect "repairs" when problems arise. IT moves can be grouped under

categories according to topic treatment, number of inquiry-reply-evaluation sequences, move functions (or teacher "question" types), and content scope (general vs. specific). Each of these types are discussed below.

IT Move-Types by Topic Treatment

The categorization of IT moves by topic treatment has to do primarily with follow-up elicitation and whether, in the course of those elicitation, the original topic of the IT is reinforced with further factual detail (in topic-bound moves), or expanded with application or interpretation of the facts (in topic-expanding moves). Once the topic of the IT has been established (usually in the opening elicitation, the teacher's choices of IT move type determine that IT's topical development, and these choices are available whenever s/he has a turn at talk. We have identified two major move-types by topic treatment: topic-bound and topic expanding moves. Topic-bound moves, as their name implies, are follow-up elicitation related to the IT topic (old information) and are mostly related to factual recall/factual information question types. Topic-bound elicitation may be pre-planned by the teacher, as, for example, a request for a math term label as a follow-up to a calculation response. Topic-bound elicitation are also used as "resolving follow-ups," to backtrack to a more certain point of student understanding, when a student's initial response is unacceptable.

Examples of topic-bound moves are requests for repetition, reporting, factual description, or definitions. The following

segment exemplifies the IT topical development through a combination of pre-planned and resolving topic-bound choices. This segment is from a sixth grade math lesson; the topic of the VOL is steps in adding/subtracting fractions. The VOL consists of (at least) eight ITs, which are not derived directly from homework, but rather from a teacher-led review.

T: (1) What I'd like to do before we begin our lesson today is to review what we do when we have to add or subtract fractions. Let's look at box 1. 7-1/8 minus 2-3/8. What's the first thing you would do..if you had to..solve that problem. Soeka.

Soeka: (2) Look at the denominators?

T: (3) You would look at the denominators? Anybody do anything different? John, what would you do.

John: (4) I'd look at the fractions.

T: (5) Why would you look at the fractions..Why is it a good idea to look at the fractions?

John: (6) Because they're the first things you add together.

T: (7) OK. Look at problem 4 in your four squares, 22 minus 18. Would you look for fraction there?

Ss: (8) No.

T: (9) Oh..If I were solving that problem I think I might. [No pause] You know why? 'Cause what if they stuck one in and I didn't see it, what would I have to do.

John: (10) Go back.

T: (11) Why would I have to go back, John?

John: (12) Because then your first step would be wrong.

T: (13) See? If I start just automatically with those whole numbers, my first step is wrong.

In this segment (the beginning of a math VOL) the teacher reviews the steps for adding and subtracting fractions. The teacher has chosen topic-bound elicitation (moves) which are appropriate to elicit factual information from her students. Follow-up elicitation (5) and (11) are interesting because they have a surface marker (why) that is thought to involve higher cognitive thinking (Shuy, 1986), though they entail factual recall in this example. Mehan's "choice" elicitation and "product" elicitation (which both entail recall) fall within the scope of topic-bound elicitation. Shuy (1986) categorizes question types as having student-generated responses (higher cognitive questions) and teacher-generated responses (fact questions). Shuy's surface markers for the former are Wh-. He includes "open-ended" questions under the high cognitive category. Shuy's surface structure markers for fact questions are: yes/no Qs, and Tag questions. The fact that Shuy recognizes that both higher cognitive questions and factual questions <u>can use the same form (wh-)</u> indicates that indeed, form alone is not a valid predictor of "question type." Indeed, teachers' "question types," according to their cognitive level as <u>fact questions</u> and <u>higher</u>

cognitive questions require primary analysis at the semantic and pragmatic, rather than at the form (syntactic, lexical) level. A consideration of form can be useful in determining the diversity of choices used by teachers to carry out larger pedagogical functions and in comparing the different functions of the same form used for different functional purposes.

Topic-expanding elicitation are teacher-initiated moves that result when teachers choose to develop the IT topic beyond factual recall. Mehan's (1979) "metaprocess" elicitation and Gall's (1984) "higher cognitive" questions are examples of topic-expanding types of elicitation.

Rippe: G/T Science Vol. "Mealworm" science unit.

T: (1) Do they have eyes?

S: (2) Yes.

T: (3) 'Kay. do they have noses?

Ss: (4) No.

T: (5) Do they have ears?

Ss: (6) No.

T: (7) How do you know? How do you know whether they have (any of those) or whether they do not. Karen?

er Karen: (8) Well, I know they have eyes cause it was on the chart. And I knew that they didn't have noses cause I looked it up but, I don't know if they have ears or not.

T: Okay, Do you, how would you figure, how would you try to determine that? Glenn.

er Glenn: (10) Test their reactions to certain sounds.

T: (11) Okay.

er Glenn: (12) Like, see, you know, like put 'em up to (like[/light] sound) to see if it affects them.

T: (13) Now, would that necessarily say they had ears?

Ss: (14) No.

T: (15) It would be an indication that they reacted to sound. Because of the vibrations, correct?

In this segment (7, "How do you know?") is an example which can be initially identified as a topic-expanding move. The previous factual recall elicitation (1), (3) and (5) set the stage for (7), when we examine the student's response (8) we find that her answer is more topic-bound than topic-expanding. Although the teacher's question would seem to call for a topic expansion concerning reasoning processes, Karen's response does this only in a trivial sense; she actually reports the location(s) of the factual information. The teacher accepts this response (with "Okay...," turn 9), and in so doing accepts the student's interpretation of his elicitation as topic-bound. Therefore, (7) actually turns out to be a topic-bound elicitation. On the other hand, the teacher then requests (in the rest of turn 9) that another students explain and elaborate by figuring out how to solve a problem for which there is no factual background. Thus, this elicitation is virtually non-

negotiably a topic-expanding move. And indeed, the remainder of the IT is an expansion in the direction which the teacher wants. Our data show that, both 3/6 math/science VOLs/ITs ??? a good amount of topic-bound moves, rather than topic-expanding ones. This is consistent with research findings of classroom questions and answers. For example, Watson and Young (1986:126) report that "about 80? of teacher questions are likely to call for memory processes only." Our data also show little or no student involvement in student-initiated VOL inquiries. It makes good educational sense to involve students in verifying their own learning. By allowing students to contribute VOL inquiries as well as replies, their point of view about knowledge would surface, and more active participation in verbal VOLs would be promoted. In addition, students would acquire the functional sociolinguistic ability to inquire, and would develop a repertoire of functional language types to do so. the way things are now, students become adept at replying to mostly topic-bound "questions." Following, in Tables 2 through 5, is an initial account of the nature of teacher's elicitation and the language function choices used by the teachers in our sample during 3rd and 6th grade science and math lessons. The analysis displayed in these four tables was arrived at through examining observation notes as well as transcripts of the videotape excerpts under consideration. The tables indicate the functional intent of teachers' elicitation, within a continuum from higher frequency to lower frequency of use (top to bottom). We included sub-

sample of gifted and talented 3 and 6 grade students and have "lumped" results with those of the "regular" 3 and 6 grade sample. We found that the relative ordering was the same for both G/T and "regular," although G/T VOLs showed a much greater use of elicitation which fall into the "higher-cognitive" category (Gall, 1984).

IT Move-types by Scope

We have found examples of both minimal ITs (elicitation-reply-evaluation), where each turn-at-talk corresponded with a move, and extended ITs, having a more complex topical progression through (mostly) topic-bound and topic-expanding moves. The moves in extended ITs do not show a one-to-one correspondence between turns-at-talk and functional intent. Rather, they show that teachers use one turn-at-talk to accomplish several purposes. for example, they might evaluate a student's reply, followed by a "summary" statement where the teacher elaborates, paraphrases the student's reply and the IT in general, followed by a "transition" move toward the next IT, AND followed by the IT elicitation. To successfully co-construct ITs with the teacher, it is important that students--especially language-minority students--understand at all times the different, but complementary intentions of the teach , as manifested in the linked moves within each turn-at-talk. Teachers normally mark transitions between functionally-different moves, especially those that are grouped in the same turn-at-talk. This is done through shifts in gaze/or stance increases or d creases in voice

volume, and the use of discourse markers such as now, okay, well, so, then, etc.

IT Move-Types by Content Scope

The teachers in our sample checked students' learning of lesson content through elicitation of general vs. specific information (in both topic-bound and topic-expanded types). In addition, they used these two choices as a strategy for thematic continuity. Content-general was followed by content-specific "questions" together with simplification and rephrasing of their initial content-general inquiry to repair IT deadlocked progression. For example, when follow-up moves did not elicit the reply sought by the teacher, then s/he initiated the same IT all over again with a more specific inquiry that covered only one aspect (issue, problem) of the original inquiry (example, see Mrs. Hartman, Excerpt #7, IT#4 (64)). How and why do ITs develop, from a minimal 3-part sequential exchange unit into a series of 3-part exchanges tied together around a topic, or sub-topics?

1) Negative/partially-correct evaluation ("repairs"). The teacher has at least two options to "repair" the IT. S/he can reject the student's response, or provide a partially-positive evaluation. The teacher extends the IT by initiating follow-up elicitation (which call for clarification, further information, etc.) until an acceptable reply is positively evaluated. After an unacceptable or partially-correct response, the teacher might answer her own inquiry, thus ending the IT.

Mrs. Kraft:3 (Math VOL: multiplication/addition sequence)

(math problem to be solved: 7x4+3=)

T: ...Good, I think we'll do the next one. Larry?

L: Seven time four.. is twenty: seven

T: Oh, now think..

L: Twenty-eight

T: Twenty-eight, my, good

L: ..plus three equals thirty

T: Really? What's eight and three, Larry..can you think...

L: Ah, thirty-one

T: Very good. All right, four times seven is twenty-eight, plus three is thirty-one. Who can do the next one?...

In the above IT, the teacher twice signals non-acceptance (negative evaluation) of Larry's responses. After Larry, unsure about the right response says that 7x4=2=, the teacher warns him: "Oh, now think..." Larry comes up with the right response: 7x4=28, and continues with the second part of the problem (adding 28+3). Larry says: "28 plus three equals thirty." The teacher indicates non-acceptance with "Really? what's eight and three, Larry?" Larry gives the correct reply ("ah, thirty-one") and the teacher accepts it ("very good..).

Mrs. Kraft:3 (Math VOL: multiplication/addition sequence)

T: Now let's look up here at step one. It says: "multiply ones, trade ten ones for one ten." Who can do this first step. All right, um, L.T.

LT: Six times three equals eight, two-

T: No it doesn't equal eight, it equals...

LT: eighteen

In this IT, LT gives the incorrect reply ("six times three equals eight, two-") and the teacher gives a very direct, negative evaluation, followed by a "sentence-completion procedure" (Mehan, 1979), whose intent is that of a re-statement of the problem.

Mrs. Hartman:6 (math VOL: adding/subtracting fractions)

T: Ok, good. What are the denominators?

?Neal: 4 and 4

T: [And] what are we gonna, what sign shall we put around them?

S: Square

T: Excellent. What do we do with those denominators now, Megan?

M: we...go to the..numerators?

T: Ok, but before you go to those numerators you have to ask yourself a question about those denominators

M: Are they the same

T: Are they the same. are they?

M: Yes

T: What are they?

M: Four and four

M: Good...

The above IT contains an example of a partial-acceptance followed by a statement that clarifies why the student's response was not

completely accepted ("OK, but before you go to those numerators you have to ask yourself a question about those denominators").

The above are typical examples of how the teachers in our sample handled "wrong" or partially-correct responses and how the teacher and students "repaired" the IT and resolved it successfully. There are no examples of teachers rejecting wrong responses and closing the IT.

2) When the student's reply is correct and the teacher accepted the response. When the follow-up elicitation stays within the bounds of factual information such as Mrs. Hartman's 6/Math VOL, Excerpt #5. This IT is characterized by a series of topic-bound, factual recall elicitation about sequential procedures and rules for subtracting mixed numbers. Topic-bound follow-up inquiries call for factual recall responses. They include Mehan's (1979) choice elicitation, which contain the information that the respondent needs in order to develop a reply, and product elicitation, which require that respondents provide factual information in their response such as names and places. The pedagogical functions of topic-bound elicitation include requests for repetition, reporting, factual description, definitions.[7]

The teacher also has the option of using follow-up elicitation which require that students give their opinions, interpretations, predictions, and elaborations of their own thinking (or what Mehan calls responses to precess elicitation.

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[7]Even "Why" elicitation (questions), which are usually thought to signal higher cognitive thinking (Shuy, 1986) can be--as is Mrs. Hartman's example--topic-bound.

Follow-up elicitation can also require that students formulate the grounds for their reasoning (what Mehan calls responses to metaprocess elicitation, since each one of these acts requires that students responses fulfill the principle of conditional relevance. The IT extension continues, or is terminated, at the discretion of the teacher. These follow-up elicitation are what we call topic-expanding elicitation/responses. The best examples in our data are from the Gifted and Talented 6th grade sub-sample.

Mr. Rippe:6 (Math VOL: discussion of homework on probabilities)

T: Okay, what do you notice about the graph, Katie?

K: Well, it goes all the way up, and then stays at that, like two points and then goes all the way back down.

T: Uh um, Erica?

Mr. Rippe/6 (same VOL)

(Students rolled sets of three dice to compare results with the statistical probability of getting a total of eleven.)

T: [Let's see what] people get here, Karen and Jennifer?

K: We got ten

J: ten

T: [to Time, Michael and Glenn] What did you get?

T/M/G: Twelve

T: [to Katie/Erica] What did you get?

K/E: seven

T: Okay, why didn't you always get that. Karen?

K: Because the probability is just an estimate; it's not an exact count.

T: All right. Probability is just an estimate; it doesn't necessarily have to happen that way

In the above IT we see a combination of topic-bound follow-up elicitation which set the stage for a topic-expanding follow up ("Why didn't you always get that, Karen?").

Questions and Answers: Educational Relevance

Educational researchers are in disagreement about what kinds of teachers' questions (inquiries, elicitations) promote students' learning and cognitive development. A distinction has been made between fact and higher cognitive questions. On the matter of which type is more conductive to learning, Gall (1984) "would conclude that (1) emphasis on fact questions is more effective for promoting young disadvantaged children's achievement, which primarily involves mastery of basic skills; and (2) emphasis on higher cognitive questions is more effective for students of average and high ability, especially as they enter high school, where more independent thinking is required" Gall goes on to say that "while emphasizing fact questions, teachers of young disadvantaged children should take care to include some higher cognitive questions to stimulate development of their thinking skills (Ibid:41).

Another distinction made by several educational researchers (e.g., Gall, 1984; Dillon, 1984) is a broad functional one between "recitation" and "discussion." During recitation,

students "recite" what they already know or are coming to know through the questioning. Recitation is a rubric covering various activities called review, drill, quiz, guided discovery, inquiry teaching, etc. On the other hand, discussion covers activities where teacher and student "discuss" what they don't know. For Gall (1984), recitation is characterized by teacher-student and student-student interaction. It also means the encouragement of complex thinking abilities and attitude change (Gall, 1976).

Although the recitation method has been criticized (e.g., Shuy, 1986; Dillon, 1984; Hoetker and Ahlbrand, 1969), it has been and continues to be a pervasive teaching practice. Gall attributes its popularity to its effectiveness. The practice and feedback effect affords students "practice recalling content and thinking about it...[and] feedback about the accuracy and quality of their answers" (Ibid:44). Gall says that "when students hear a question during recitation, they are likely to rehearse the answer carefully. Students do this because they develop an expectation based on experience, that the same question will be included on a subsequent test" (Ibid:44). In classrooms with speakers of English as a second language, this would be an opportunity to "rehearse" good answers, whether publicly or to themselves. Two other effective outcomes of the recitation teacher-student activity is its similarity to the test situation (both have question/answer format) and the "modality effect": speaking/listening keeps students more "engaged" than does seatwork (Gall, 1984).

Both "factual" recall (recitation) and "higher cognitive"-type inquiries have an important place in the process of learning through interaction. Gall's arguments for the effectiveness of "recitation" are convincing and call to our attention the fact that not all teachers inquiries need be "higher cognitive" in nature to be effective and conducive to learning. Rather, we feel that factual recall questions are indispensable in math and science--especially in math--when students (3/6 grades) are mastering the basic operations (such as multiplication, etc.). Of concern are patterns of teachers' questions which tend to stay at the level of "factual recall" and not expand facts into substantiations and applications to the students' real world.

There is also the issue of control. The teacher who uses higher cognitive questions must in the process relinquish some control of the interaction to the students. From the teacher's perspective, students socialized to school norms would be less likely to steer the interaction in unexpected directions. Nonmainstream students, on the other hand, will in many cases have interactional norms (in Gumperz' sense) and agendas which differ from those of the teacher. Teachers are likely to perceive a greater relinquishment of control of the discussion when "unsuccessful communicators" and nonnative English speaking students answer higher cognitive questions. In factual recall inquiries, the teacher has full control of the response.

In the present study, our observations of four classrooms--two third and two sixth grades--yielded evidence that variat n in the position of the "Verifying Learning" activities during the lesson is related to differences in style of teaching, how teacher "link" old information with new information and the methodology advocated by the science/math curriculum being used. During our observation we found that teachers used VOL activities to:

- "review" already taught information before introducing new information
- help students understand new information by referring to or making verbal inquiries about old information
- verify and evaluate student knowledge about old information in a more extensive and structured manner
- evaluate students' understanding and their readiness to go on with more complex information
- diagnose students' abilities
- evaluate student preparation for a learning task
- determine to what extent academic objectives have been achieved
- stimulate student participation
- involve students in creative thinking
- arouse student interest
- support students' class participation

The influence of the curriculum in the position and nature of verbal interaction is another important variable. The

elementary science curriculum used in our target schools is activity-based and "designed to develop critical thinking skills and to promote general scientific literacy" (Simich, 1984:84). The curriculum consists of six grade levels and is patterned after the Elementary Science Study (ESS) developed with support from the National Science Foundation. Science "kits" of experimental materials are assembled at a central point, and "loaned" to teachers for the duration of each science unit. Students often work in pairs or small groups to conduct the experimental activities, and during this (instructional) time, the teachers whom we observed would circulate among the students to observe and comment/question informally. The science curriculum encourages such verbal interaction/experimentation between teacher and students rather than a more formal, clear-cut lecture and evaluation style. A teacher who feels comfortable about engaging his/her students in exploratory verbal interaction creates collaborative instructional activities <u>with</u> their students.

Style of teaching, as a factor influencing student verbal interaction and participation is an important variable to look into because it helps us to better understand the relationship between what the curriculum asks teachers to teach, including methodological guidelines, and the way in which teachers actually provide instruction and evaluate student learning.

VOL/ITs do not normally provide the students the opportunity to initiate inquiries and "collaboratively" develop appropriate

responses/solutions to teachers questions. Students must be given this opportunity to actively initiate and engage in critical thinking about aspects of knowledge they want to highlight, and to develop the linguistical and interactional skills they need to initiate and negotiate with the teacher and classmates.

In addition, we emphasize the need for cultural and situational knowledge that allows both teachers and students to interpret their intentions and purposes in classrooms with mulitcultural student populations. Lack of shared background knowledge makes miscommunication a factor which might have serious consequence for the student(s). When students come from cultures different than that representative of our educational system, even though they might be fluent speakers of informal English, their academic language talk is not clear due to the fact that their intentions cannot be determined and/or that they are signalling--and interpreting--intentions using culture-specific conventions, at the levels of prosody, semantics, and interaction. In the case of VOLs, the teacher, to a great extent--if not exclusively--determines the purpose of the communicative interaction and the nature and function of the ITs that make up the VOL activity. If a culturally-different student misunderstands the purpose of the activity, a successful evaluation of the student's learning--or successful response--is not likely to occur. Thus, teachers must acculturate students to VOL/IT activities, making sure that all students can answer the

question: What is going on here? and that they become not only speaker of English but socially-aware users of academic language talk. Since ITs are successful when there is cooperation between teacher and students, it is particularly important that non-native English speaking students understand their responsibility for "old information," and how to provide this information "on cue." It is also important for all students to understand--and use--the right to expand and contribute to teacher-initiated ITs. In fact, we believe that VOL/ITs should not only be teacher-initiated but student-initiated.

VOLs have a general evaluative purpose. This general purpose covers a range of specific evaluative purposes, from reviewing and discussing old information to diagnosing and evaluating student knowledge for grading purposes. It is important, both pedagogically and linguistically, for teachers and students to understand the instructional and evaluative uses of "question-answer" activities in general. During VOL activities, the evaluative goal is very salient and students are held accountable for--and evaluated by--their replies. During VOL teachers gain a general understanding about "group knowledge" which helps them to organize their next teaching--or re-teaching--moves. During instructional activities, the teacher's main purpose is to provide the students with the opportunity to explore new concepts and skills. The function of VOL/ITs during Giving Instruction activities is to encourage students, through question/answer verbal interaction to make comments, predictions,

give opinions, etc., about new information. Students rely on their "world view" and experience to advance predictions and substantiations of their thinking. Cross-cultural differences might make it difficult for limited-English-proficient and other minority students to make valid verbal contributions that are purely expansions of new information. However, these same students will benefit from VOL activities even though these activities are mostly evaluative. As has been discussed in the summary of the interview data, students in our sample told us that they learn from the interaction, that they clarify emergent understanding about math and science concepts and skills <u>even if they do not verbally participate</u>. Limited English-proficient students, especially those students who come from less verbal, less competitive cultural backgrounds, can benefit from this second and less recognized function of VOL/ITs.

Our research indicates that the teacher has a communicative repertoire which is specific to verification of learning "interactive task" co-construction with selected students. This repertoire includes:

- The organization of interaction through student selection or turn-allocation procedures

  The teachers in our sample used a variety of turn-allocation procedures: individual nominations (Mehan, 1979) were by far the most commonly used procedure. They also used invitations to reply (Mehan, 1979) which lead to choral responses and

invitations to reply (Mehan, 1979). In addition, teachers' used "sentence-completion" procedures (Mehan, 1979) and "recyclable tasks" (Griffin & Humphrey, ???). The incidence of one or another seemed to be related to teacher style of interaction or teacher turn-allocation "blueprint."

- Pedagogical intent which is made operational through functional discourse and interaction
- Selection of specific "moves" during IT development which in effect serve as the steering wheel of the IT

Students do not play passive roles during ITs even though the teacher takes a leading role in the process of verifying student learning during verbal interaction. They have choices. Some of these are the use of:

-"Complementary responses" to teachers' inquiries which would technically provide the response the teacher asked for (but not necessarily an IT closing because of the teacher's right to exercise one or more of the choices in her own repertoire

-"Expanding responses" or those responses which consist of a "complementary" move followed by an expanding move. This student option has the effect of forcing the teacher to respond <u>in the communicative direction (intent) initiated by the student</u>

- "Expanding responses" which shift the topic to another related topic, or to a completely different topic
- Responses which are requests for clarification, or paraphrases of the teacher's initial IT inquiry, or subsequent "expanding inquiries."
- Uncooperative tactics, such as refusing to reply to a teacher inquiry
- Role shifting: by being VOL/IT initiators as well as responders.

Teachers and students have--or should have--knowledge of the above "strategies" which they need to use during the process of negotiating the outcome of the ITs. Since teachers and students have available to them a varied communicative repertoire, the question--or questions--about what variables (sociolinguistic, pedagogical, students' communicative characteristics, etc.) prompt participants to use one rather than the other need to be explored. What variables prompt the participants to select one strategy over another? Is the use of some "strategies" related to student designation as "er" or "ur?" 3rd or 6th grader? "Gifted and Talented" students vs. "Regular" students? What role do pedagogical/curriculum goals play in "shaping" the VOL math and science IT? This section explores these questions by examining the database or transcripts of selected math and science VOLs video tapes.

Are There Differences Between 3rd and 6th Grade VOL/ITs?

Teacher style of interaction together with curriculum orientation, and subject matter, determine in large part the functional orientation and development of VOL/ITs. No noticeable differences were found in the ways in which teachers organize interaction (turns-at-talk) in 3rd and 6th grade levels, or in the move-types used by teacher to fulfill the pedagogical function of the VOL/IT. However, there seemed to be a difference in the manner in which teachers evaluated students' responses. Third grade teachers always gave students and evaluation. Correct answers were not only accepted, they were often praised, as in this example from a third grade science VOL. The topic being reviewed here is "terms about sinking and floating," and students are reporting their results from a card-matching task in which they were to match definitions to terms:

T: All right. We did "prediction": "telling what you think will happen." What did you have for "buoyancy." Carolina.

C: "How it float or rise in the water" [flat intonation]

T: Super! How about "sink." Nardis?

T: All right

The two VOL segments above are representative of the kind of evaluative moves the third grade teachers made. By all means, these teachers--including the 6th grade teacher--avoided negative evaluations, and outright rejections.

Sixth grade teachers (both "regular" and G/T) evaluations tended to be less directly positive or negative. One interesting

feature of evaluations at this grade level is the "zero evaluation" and the indirect positive/negative evaluation. These characteristics we also found in the 3rd grade G/T math VOL transcript. Some examples follow.

Rippe/6/--G/T Science (mealworms science unit)

T: And we talked about the petri dish, that you keep in, why do you have to keep it clean, if you did, Erica?

E: Cause if the water gets to them and rain like it did in mine, today, I had to clean it out because it starts molding

T: Molding. Okay, and another problem, might do what to the mealworm. Karen

K: Kill'em

T: Are they useful for anything? Karie? Think they are useful for anything?

K: I think they are because we are studying them. It's neat to watch how they change, so it's useful for us to learn why different animals change like that.

T: All right, are they to be handled in a special way, Nicole?

N: Yes, you're not supposed to pick them up with your fingers

T: You could but what might happen, M. Ancona?

M: You might crush them

T: Crush them...

Hartman/6 (math: addition/subtraction of fractions)

T: ...What number shall we use to divide into 4 and 8?

Ss: Two

T: We can divide it by 2. How do I write that. How do we write that on our paper, Alison?

A: You put the division sign, and then 2 over 2?

T: All right, two..fin...two over two. Four divided by two over two. What's the next step, Jimson?

J: Mm..you divide um four into two

T: And 4 divided by 2 is?

J: Two

T: Two and..what's my next step, John?

J: You divide um eight into two

T: Eight into two, and the answer is

J: Four

T: Four...

These two segments are representative examples of VOL segments which show a range of teacher evaluation moves, from direct positive evaluations, to signals of acceptance by repeating the students response, or "zero evaluation" which signals acceptance. Why these differences in the way in which teachers signal some type of evaluation by grade level? One possible answer might be teacher perception that 3rd grade students need overt positive evaluations when they give a "good answer" and that these students are in a process of acculturation to the school language that they need the redundancy of direct evaluation moves to master that 3-step, minimal IT unit. On the other hand, 6th grade students can go beyond their basic understanding of this unit into variations (e.g., evaluation

omission, signals of acceptance by repeating the student's response) whose signals they understand. It seems that by the 6th grade, teacher and students will have developed a larger, more sophisticated VOL/IT repertoire, including the production and interpretation of evaluation move.

Are There Any Significant Differences in Teacher/"er," Teacher/"ur" Interaction During VOL/ITs?

Definite patterns did not emerge. However, we have examples that show differential treatment of "ur" students over "er" students. A case in point is Mrs. Hartman's differential treatment of correct responses from John (an "er") and Soeka (a "ur") in her sixth grade math lesson reviewing the steps involved in adding and subtracting fractions. (This interaction is Excerpt 7, and is discussed in detail in Chapter 3, pp. 50-60, and also in Simich-Dudgeon and McCreedy, 1987.) John's correct responses were praised, although the previous discourse had virtually guided him to the correct responses, but Soeka's correct response, by contrast, was rejected, perhaps because it was not expressed in the way the teacher had in mind.