DARING TO ASK THE HARD QUESTIONS: THE EFFECT OF CLINICAL INTERVIEW TRAINING UPON TEACHERS CLASSROOM QUESTIONING

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This paper considers how teachers' questioning behaviors are observed to change after training in and using clinical interviews. Seven elementary mathematics teachers participated in trainings in clinical interviews. They were videotaped while introducing a new mathematics topic to their students prior to and after four months of the training. Their questions were identified, classified and codified according to their functions. Comparative results showed that teachers' use of questions that shape understanding or press for reflection increased in the post-training lesson.

INTRODUCTION

This study is a component of larger research that examined the relationship between elementary mathematics teachers' training in clinical interview and their instructional efficacy (Haydar, 2002). In particular the general research aimed to examine how would training teachers in clinical interview affect their sense of instructional efficacy, their questioning behaviors and their responses toward students' mistakes.

The focus of this report is to describe the changes in the function of questions that teachers used in their instructional discourse after training in clinical interviewing.

THEORETICAL FRAMEWORK

This study draws upon a solid conviction in the uniqueness and strength of the clinical interview, developed by Jean Piaget (1926), as an attempt to take full advantage of both testing and direct observation and, at the same time, to avoid their disadvantages. He presented the clinical interview as a research method that could portray the child's natural mental inclination and identify underlying thought processes. As noted by Clement (2000), the strength of the clinical interview over other data collection techniques includes

> the ability to collect and analyze data on mental processes at the level of subject's authentic ideas and meanings, and to expose hidden structures and processes in the subject's thinking that could not be detected by less open-ended techniques" (p. 547).

A clinical interview, as defined by Hunting and Doig (1997), is a "dialogue or conversation between an adult interviewer and a subject. The dialogue centers around a problem or task chosen to give the subject every opportunity to display behavior from which to infer which mental processes are used in thinking about that task or solving that problem."

The investigator adopts the recent calls made by various mathematics educators, professional organizations and curriculum reformers (NCTM, 2000; Ginsburg et al., 1998) for the use of clinical interview by teachers in their classroom instruction, as a powerful and necessary mean to help them meet with the current reform expectations. This sounds especially valid when we consider the shift witnessed in mathematics

education towards a problem solving approach that emphasizes on conceptual understanding, problem solving, and children's constructions of mathematics.

Another theoretical stance for this study is the view of professional development of teachers as central for improving schools and instruction (Sykes & Darling Hammond, 1999). A professional development is thought effective when it observes the six principles suggested by Little (1993). In her model Professional development (1) offers meaningful intellectual, social, and emotional engagement with ideas, materials, and colleagues, both in and out of teaching, (2) takes explicit account of the contexts of teaching and the experience of teachers, (3) offers support for informed dissent, (4) places classroom practice in the larger contexts of school practice and the educational careers of children, (5) prepares teachers to employ the techniques and perspectives of inquiry and (6) ensures bureaucratic restraint and a balance between the interests of institutions.

In this model training is considered a balanced part of a larger configuration and professional developers are expected to immerse in the actual instructional settings where teachers work.

METHOD

Participants in the study were seven elementary school teachers, one male and six females who taught mathematics in Beirut and Baakleen, Lebanon, in a setting described as shifting from a traditional to a reform vision of learning and teaching. They taught in two schools that were complying with the implementation of the New Lebanese Curricula developed by the National Center for Educational Research and Development (NCERD) in 1997. The new Curricula sought to reach and parallel recent international changes and findings in education, schooling, and psychology.

More specifically, the mathematics curricula adopted an equity principle that eliminated elitism in learning mathematics and called for math-for-all instruction. They aimed to empower all students in mathematical reasoning and problem solving (Dagher, 1999). To meet this vision, a shift in teachers' professional development programs was urged in order to follow the paradigm shift occurring worldwide.

The seven teachers participated in a six day-long training sessions in clinical interviews developed by the investigator at an earlier stage of the broader study. Data for this study were collected in three stages: pre-training, training, and post-training. Each teacher was filmed twice, once as part of the pre-training exploration, the other during the post-training stage. While the actual topic to be taught was left to the teacher, the investigator requested that each teacher include an introduction of a new mathematical concept. This criterion aimed to guarantee a sufficient amount of teacher talk for comparative purposes since teachers might talk minimally in some other instructional situations such as students working on set of exercises or practicing certain algorithms.

Training

The training was designed according to paradigms for teacher development that emphasize "action-reflection"(Hunting & Doig,1997). It consisted of a six-day workshop

that took place over three different week-ends spread over a period that included other research activities (classroom observations, clinical interviews and focus groups). The training was well received and evaluated positively by all participants. They had all been unfamiliar with clinical interviews prior to training, and they practiced interviewing and could evaluate their experience during and after training. In their final evaluation logs, five teachers expressed their intention to implement interviewing in their teaching. At the administrative level, the academic principal of one school, who had attended most of the sessions, had very positive impressions. She informed the investigator that she had suggested at an administrative meeting that they consider training all teachers in clinical interviews; this was later confirmed in an e-mail received by the investigator.

Data

To analyze the questions that teachers used in their instruction, pre-and post-training videotaped lessons were used. The investigator watched the videos of the lessons, one tape at a time. For this study, a definition of a question was adapted from the *Glossary of Linguistic Terms* (Loos, 1999) where two senses of a question are given; (1) a question is an illocutionary act that has a directive illusionary point of attempting to get the addressee to supply information (e.g., tell me your name) and (2) a question is a sentence type that has a form (labeled interrogative) typically used to express an illocutionary act with the directive illocutionary point mentioned above (e.g., what's your name?).

In the classroom context, a teacher's utterance in this study was considered a question whenever she attempted to obtain information from the student, or whenever she used the interrogative pro-form. The investigator believed that, as noted by Kubinsky (1980), questions must be identified by considering their potential answers. This suggests that questions cannot be identified or classified apart from their answers. Thus, the investigator decided to identify and classify questions simultaneously as one step. The study was also interested in examining questions according to function rather than type, dimension or style.

According to function, investigator would ask: "What did the teacher want this particular question to do?" This stance was favored because clinical interviewing was believed to result in a functional change toward more thinking and reflection in the classroom. Questions were categorized according to their general function, as suggested by Morgan and Saxton (1991). According to their model, questions could be classified into three broad categories: Category A, *Questions which elicit information*; Category B, Q*uestions which shape understanding*; and Category C, *Questions which press for reflection*. Within each category, a number of subcategories and particular functions are defined

After a question was identified, classified, and codified, the investigator arranged it on a question spreadsheet consisting of three columns: the first for the ordinal number of the question (Q1, Q2, Q3, etc.); the second for verbatim questions; and the third for the corresponding code. When finished with a whole video session, the investigator calculated the total number in each of the three categories, along with hypothetically critical codes and sequences of codes. He then derived percentages, which were used to compare the pre- and post-training results.

Hypothetical Expectations

At the category level, the investigator expected that a clinical interview attitude would result in an increase in the percentages of both B and C questions at the expense of the A questions. This was based on the nature of clinical interviewing as a means of shaping a student's understanding and targeting the student's reflections on the answers.

Some specific codes were also believed to increase because of learning and the use of clinical interviewing. These codes corresponded to questions that value students' informal knowledge of the material (A7); press for rethinking (B2a); demand inference and interpretation (B4); and promote expression of points of view (B5).

RESULTS

In all, 583 questions were identified within the pre- and post-training videos of the subjects' lessons: 287 from pre-training lessons and 295 from post-training. The comparison found that teachers' use of questions that shape understanding (B) or press for reflection (C) indeed increased in the post-training lesson. They used more questions like "what do you mean by?" ,"Why did you do it this way?" or "Who can solve it using another strategy?"

Comparative data indicated that no real gain was accomplished in A7 (informal knowledge) questions. Four teachers never asked such questions either before or after; the other three used them in a very small percentage, compared to other functions of questions. All seven asked their students to rethink or clarify their thinking more often in post-training sessions (B2a questions). Four subjects who had never asked this type of question in their pre-training session used it in a range of 12.8% to 17.7% of the total number of questions during their second videotaped lesson. Percentages increased for the other three teachers as well. All but one teacher used more B4 (inference or interpretation) questions in their post-training sessions compared to their total questions. Interestingly, one teacher who had not used B4 questions in her pre-training had the highest percentage (23.7%) for post-training. As for B5 questions that focus on the meaning behind the actual content had increased slightly in the discourse of six out of the seven teachers.

Although not part of the study's initial agenda, the video transcripts permitted the investigator to report preliminary findings on the identification of a presumably effective, even ideal sequence of consecutive questions. For example, some specific sequences of consecutive questions also appeared related to clinical interview training. Recall of a fact question (A5) or a question supplying information (A6) could be followed by a rethink or interpretation question (B). The investigator examined this sequence and found that it became surprisingly more frequent in post-training sessions, compared with A5/A6 questions not followed by a B question.

CONCLUSION

The study found that teachers' use of questions that shape understanding or press for reflection increased in the post-training lesson. More specifically, questions that asked students to rethink or clarify their thinking, and questions that demanded inference and interpretation had increased the most. Slightly increased were questions that focused on

the meaning behind the actual questions. No change had been discovered in questions that asked students to reveal experience. The sequence of a question that asked to recall facts, followed directly by a question that shaped understanding, was repeated more frequently in the post-training.

With the major role that questions play in shaping classroom thinking environments, professional developers who want to help teachers improve their questioning behaviors may want to consider seriously clinical interview training as a tool to achieve this goal.

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