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**TEACHER-STUDENT INTERACTIONS IN SINGAPORE
CLASSROOMS: A CORPUS-BASED STUDY¹**

1. Introduction

Among various language patterns of classroom discourse, the three part-exchange structure, typically called IRF is perhaps the most ubiquitous discourse format anywhere in the world. It has long been intensely researched in classrooms of both language learning and the learning of content subjects. It has been identified as the most traditional means of knowledge transmission in classroom academic learning [Cazden, 2001], but in the recent reconceptualization of the IRF pattern, some researchers [Hall & Walsh, 2002 for a review] have identified that this teacher directed pattern of interaction is manifested in different forms or patterns with some providing scaffolding and enhancing students' opportunities for learning and others fail to do so. However, most existing research approaches these discourse patterns qualitatively in terms of case studies, and research with large data corpus is rare. Therefore, in this study, we examine the IRF patterns and their functions in English classroom learning in Singapore, drawing upon a large data base of the Singapore Corpus of Research in Education (SCoRE) [Hong, 2005; Hong & Doyle, 2009]. More specifically we adopt a perspective of sociocultural theory and use a corpus linguistic approach to address two major research questions: 1) what patterns of IRF emerge in English Language classrooms in Singapore primary schools, and 2) how they are structured interactionally in scaffolding student English language learning.

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2. Theoretical Framework

The theoretical framework we use for the present study is sociocultural theory which views students' learning as a mediated process within social and cultural context [Kinging, 2002; Lantolf, 2000]. It situates learning in the zone of proximal development (ZPD) [Kinging, 2002; Lantolf, 2000], which is described as the difference between the original independent capability of a learner and what he/she is able to achieve when given some intellectual guidance and support [Mercer, 2000]. In classroom pedagogic practice, the notion of the ZPD and scaffolding highlight the way teachers can assist the participation of students in classroom activities, for example, by directing attention to key aspects of a task, simplifying a task, monitoring ongoing performance, and providing appropriate feedbacks depending on their level(s) of understanding in classroom interaction [Tharp & Gallimore, 1988]. In classroom communication, the verbal interactions between teachers and students not only help teachers diagnose students' ZPD and mediate knowledge construction, but also provide linguistic input and create opportunities for students to communicate in the target language. These functions of teacher and student interactions call for an examination of classroom discourse patterns that facilitate students' classroom learning and language development.

3. Data and Method

The data for this study are drawn from the data pool of the Singapore Corpus of Research in Education (SCoRE) [Hong, 2005; Hong & Doyle, 2009], collected by the Center for Research in Pedagogy and Practice, National Institute of Education, Nanyang Technological University, Singapore. One of the research foci of the project is to document what happens in about 1200 classroom lessons in the core curriculum areas of Mathematics, Science, Social Studies, English, Chinese, Malay and Tamil in Singapore schools. As a part of

the project, the computerized SCoRE corpus has been built of English language classroom data collected through classroom observation and audio-recording. The data for the present study are the IRF-annotated classroom talk of 120 transcribed English-mediated lessons of Grade 5 and Grade 9 classrooms.

We first develop a multi-level annotation scheme, drawing upon [Nystrand et al, 2003] and [Tharp and Gallimore, 1988], for tagging IRF patterns, including teachers' question types, types of student responses and types of teacher's feedbacks and their pedagogic purposes. After classroom transcripts are annotated with the scheme, we then use query tools to process the data. The corpus query tools help generate quantified data of IRF patterns in classroom discourse context, including the distributions of different types of teachers' questions, students' responses, teachers' feedbacks and their pedagogic functions in teacher-student triadic dialogues. With the data ready for analysis, we can then examine what IRF patterns are structured with what specific pedagogic goals interactionally in providing what scaffolded assistance for student English language learning.

4. Findings

The table below shows the IRF data of classroom teacher questioning discourse, including the frequency of occurrences and text coverage of teacher questions, student responses and teacher feedback. The table shows that in the 652857-word IRF-annotated sub-corpus, 377527 words are involved in the IRF sequences in the corpus. That is to say, the text coverage of IRF sequences in the corpus is about 57.83%. This, in general, shows how interactive these 120 lessons are.

There are a total of 45673 questions asked of students by teachers. In total, these questions have a text coverage of 265182 words, which accounts for 70.24% of the total words in the IRF texts (265182/377517). The average length of teacher's question is about 5.81 words. For student response, for all the 45673 questions asked, students provide 16357

responses which contain 52923 words and cover about 14.02% of the total words in the IRF texts. The average length of these responses is 3.24 words. The table also shows the number of occurrences of teacher feedback on student responses. For all the 16357 responses provided by students, there are about 9801 occurrences of teacher feedback, which contain 59412 words, and these words take about 15.74% of the total words in the IRF texts. The average length of these feedbacks is about 6.06 words.

Distribution of questions, responses and feedbacks in the corpus

Types	Occ.	Words	Occ. (%)	Text Coverage (%)	Length per Occ.
Teacher Question	45673	265182	63.58	70.24	5.81
Student Response	16357	52923	22.77	14.02	3.24
Teacher Feedback	9801	59412	13.64	15.74	6.06
TOTAL	71831	377517	100.00	100.00	5.26

From the above data, we can see that the interactive discourse, which involves teachers' questions, students' responses and teachers' feedback, takes about 57.83% of the total words in the corpus (265182 out of 458664). Among these triadic dialogues, the occurrences of teacher discourse (questions 63.58% and feedbacks 13.63%) are more than three times as much as the student discourse (response 22.77%), and is almost 2 times in length than student responses. In short, the data here show that in the corpus of these 120 classes, teacher questioning discourse is dominated in class and most of the lessons are still teacher-fronted in nature.

Classroom is a place where "pupils are expected to play an active part by answering questions, contributing points to discussions, and explaining and demonstrating their methods and solutions to others in the class" [DfEE, 2001: 26]. It is thus important to have a look at the distribution patterns of student responses in the corpus. For all the

14568 sets of teacher questions, 5387 did not receive any responses from students, which account for about 37% all the teacher questions. For the 9181 questions which did receive responses from students, most of them (5956 to be exact) are single response (about 65% of the total questions responded), that is, the majority of question only receive one response from students. There are 3225 questions that receive multiple responses from students, which account only 22.13% of all teacher questions and about 35.13% of the total questions responded.

Monitoring students' thinking processes, giving them feedback and motivating them to learn are not only very important tasks of a teacher, but they are also intimately related. Whether feedback is given continuously or differentially is believed to influences its efficiency. When continuous feedback is employed, students receive feedback on their performance each time they perform a given task whereas differential feedback is only provided when a student performs better on the task. As our data show, among 9181 teacher questions that have received responses from students, 9268 questions (60.40%) are not followed up with teacher feedback, and 876 questions (39.60%) are followed up with teacher feedbacks, including 3859 with a single feedback (25.15%) and 1218 with multiple feedbacks (14.49%).

5. Discussion and conclusion

As the data and analyses indicated above, the dominant discourse genre throughout the study of a large amount of Singapore classroom data is typical triadic dialogue. That is to say, it is full of sequences of IRF exchanges. This, as many observers have pointed out, is ubiquitous in classroom interactions in which the teacher is one of the participants. However, to suggest, on that basis, that the complete activity is all of a piece that without variation would be seriously misleading.

The investigations, as demonstrated here on the basis of a corpus linguistics approach to classroom interactions, have some pedagogical significance – they provide classroom teachers with a better understanding of the importance of classroom interaction in students'

learning for future pedagogic improvements or innovation. By reflecting upon when, how and why a question should be provided and a feedback should be given, teachers can therefore develop stronger awareness of the relationship between talk and learning. This would ultimately contribute to the construction of a dialogic environment to facilitate student learning and knowledge acquisition in class.

We believe this study helps illuminate the link between interaction patterns and teachers' pedagogic purposes for the development of students' language competence. Although our research is conducted with Singapore students as participants, we believe it also informs the teaching and learning of the English language in other settings. In addition, this study provides evidence that corpus approach can be successfully used in approaching pedagogic discourse and classroom learning process.

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