Chapter 11
Sounds of Silence: Examining Silence in Problem-Based Learning (PBL) in Asia

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11.1 Introduction

11.1.1 Students' Participation in EMI Universities

Many research studies indicate that Asian students tend to be silent in participation in EMI contexts in Asian universities (Jackson, 2005; Littlewood, Liu, & Yu, 1996) and western universities (Braddock, Roberts, Zheng, & Guzman, 1995; Chan, 1999; Jones, 1999). Communicative competence (Jackson, 2005), lack of opportunity to practice oral English (Jackson, 2005; Littlewood et al., 1996; Tang, 2007), and cultural differences (Flowerdew & Miller, 1995; Lee, 1999) have been frequently identified as primary barriers to participation in spoken English interaction. However, it may be an over-simplification to portray Asian students as having the characteristic of silence. Other factors, such as learners' identities (Lam, 2006) and interpersonal relations (Cheng, 2000; Kubota & Lehner, 2004; Wong, 2004), are being considered to more fully explore spoken English interaction in higher education. It is necessary to rethink learners' silent behavior in spoken English interaction. Examining this in the situated context may provide us with better understanding of silence in spoken English interaction of learners in EMI contexts. As Zhou, Knoke, and Sakamoto (2005) noted, "placing emphasis on individual characteristics of Chinese students, without considering aspects of the educational context with which those characteristics interact, may over-simplify and distort the mechanism underlying their silence in the classroom" (p. 287). This chapter therefore aims to explore silence in one situated context.

Problem-based learning (PBL) has increasingly been employed as a teaching and learning approach in higher education, particularly in healthcare education. In PBL tutorials, students are encouraged to learn collaboratively. Only a few researchers have addressed PBL in second-language learning contexts

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(e.g. Legg, 2007) with no in-depth qualitative work done to date on students' silence in PBL tutorials in this area. Given this specific context of the study, this chapter examines students' silence in PBL tutorials in an EMI university in Asia.

11.1.2 Spoken English Interaction in PBL

Interaction plays an important role in small-group collaboration and learning. To understand spoken English interaction in PBL, we need to be aware of the goal of PBL and its tasks first. The goals of PBL include helping students develop (1) flexible knowledge, (2) effective problem-solving skills, (3) self-directed learning skills, (4) effective collaboration skills, and (5) intrinsic motivation (Hmelo-Silver, 2004; Hmelo-Silver & Barrows, 2006). The goal of being a good collaborator and the interactive process of learning are often woven together (Hmelo-Silver, 2004). This interaction strongly influences student learning (Cohen, 1994; Van der Linden, Erkens, Schmidt, & Renshaw, 2000) and group effectiveness (Dolmans, Wolfhagen, & Van Der Vleuten, 1998; Wenger, 1998). Researchers argue that deep processing interactions can promote deep learning rather than surface learning (Visschers-Pleijers et al., 2006), so that students develop and construct a critical understanding of the knowledge (Newman, Johnson, Webb, & Cochrane, 1997), and enhance problem-solving skills and higher-order thinking (Brown, 1995; Brumenfeld, Marx, Soloway, & Krajcik, 1996; Vye, Goldman, Voss, Hmelo, & Williams, 1997).

In qualitative research studies of PBL in healthcare education, few studies have focused on the actual interaction process in PBL (Visschers-Pleijers, Dolmans, de Leng, Wolfhagen, & van der Vleuten, 2006; Visschers-Pleijers et al., 2006; Woodward-Kron & Remedios, 2007). Hmelo-Silver (2004) indicated that there is little empirical evidence as to what students are learning PBL, and how. Dillenbourg, Baker, Blaye, and O'Malley (1995) also emphasized that collaboration in the PBL process should be investigated more closely. There has been a general call for research that can assist practitioners to understand better what is happening and under which circumstances interaction can be effective in PBL tutorials (Visschers-Pleijers et al., 2006).

One approach to more closely examine group interactional processes is to draw on discourse analysis. A small number of such studies have appeared in the field of PBL (DeGrave, Boshuizen, & Schmidt, 1996; Hmelo-Silver & Barrows, 2006; Woodward-Kron & Remedios, 2007). DeGrave et al. (1996) observed and videotaped a group of Year 2 medical students in the PBL process to investigate cognitive and metacognitive processes in PBL tutorials. They found that the majority of verbal interactions were categorized as theory building or data exploration and examined when and where in the problem-analysis phase theory building occurred. While qualitative in design, the analysis of this classroom discourse adopted a cognitive approach to examine reasoning processes. In another qualitative study, Woodward-Kron and

Remedios (2007) adopted Halliday's systemic functional linguistics and examined the ways in which the students and their tutor negotiated and constructed meanings through language by videotaping one Year 1 physiotherapy PBL tutorial at an Australian university. The discourse analytical description of the interactions showed how knowledge was co-constructed and negotiated, as well as how the tutor used minimal but strategic interventions to scaffold the students' learning. The study presented in this chapter takes a sociocultural and critical perspective in examining the roles of silence within the interactional dynamics of PBL tutorials. This is elaborated in the methodology; however before presenting the details of the study, it is necessary to conceptualize silence in spoken English interaction in order to understand how silence is exercised and negotiated in PBL tutorials.

11.1.3 Silence

The concept of silence in this study is captured as a means of communication in ongoing classroom processes. Even though silence is often taken for inaction in communicative settings, the conceptual understanding of silence in this study aligns with the premise that silence has a communicative purpose (Jaworski, 1997; Saville-Troike, 1985). Communication theorists have long recognized that silence is an aspect of effective communication (Grice, 1989). Dauenhauer's (1980, p. 138) analysis of the "interpenetrating of discourse, silence, action and desire" also suggested that silence can be an active performance.

To further understand the issue of silence using discourse-based approaches, the study presented in this chapter employed conversation analysis (CA) to initially identify silence at the turn-taking level. Critical discourse analysis (CDA) was then drawn upon to provide a holistic perspective based on both social understanding of discourse and linguistic analysis (Caldas-Coulthard & Coulthard, 1996; Fairclough, 1995). By rooting the conceptual understanding of silence in spoken English interaction in CDA, the study extends the educational space to the social, cultural, and political dynamics of language use, not just limiting it to phonological, syntactic, and pragmatic domains (e.g. Kumaravadivelu, 2006; Markee, 2002; Norton, 1997; Pennycook, 1999).

The issue of silence is one important but under-researched issue to be addressed in PBL contexts. Halth-Cooper (2003) investigated tutors' experiences of facilitating PBL. Nonverbal communication was identified as one out of six themes but was reported by facilitators' brief perceptions rather than observational data. Remedios, Clarke, and Hawthorne (2009) investigated four "silent" students' PBL experience in an Australian university with two overseas-educated and two local Australians selected as "silent participants" in PBL tutorials. This previous work has highlighted the worthiness of the issue but, as noted above, no in-depth qualitative work has been done to date on students' silence in PBL tutorials in second-language learning contexts.

Tolerance of silence has been considered in many fields. A study by Wilkerson, Hafler, and Liu (1991) investigated what interactions characterized student-directed discussion and students' responses in PBL tutorials. Factors included tutors who questioned infrequently, provided limited information, tolerated silent periods, and smooth turn taking (Wilkerson et al., 1991). Jefferson (1989) originally proposed that the average timing for the toleration of silence for participants in naturally occurring conversations in English is around one second. Later studies indicated that the relative length of pauses is considered in light of the broader, language-specific context (Nakane, 2005; Sajavaara & Lehtonen, 1997). In environments with mixed language backgrounds and abilities, Carroll (2000) argued that long gaps in non-native speakers' turn-taking behavior cannot be attributed simply to a lack of language proficiency.

11.2 Methodology

11.2.1 Questions and Data

The study reported in this chapter is part of a larger research project on silence in spoken English interaction in PBL tutorials, which explores the role of silence for communication, learning, and identity in PBL tutorials at an EMI university in Asia. The research question addressed in this chapter was this: What are the roles of silence in spoken English interaction in PBL tutorials?

With a particular focus on roles of silence in spoken English interaction in PBL tutorials, a multimethod approach was necessary to ensure the trustworthiness of data collection, analysis, and interpretation (Bridges & Bartlett, 2009; Bridges, McGrath, Yiu, & Cheng, 2010; Louis, 1982 in Sturman, 1997). Multiple data collection methods (questionnaires, interviews, classroom observations, and stimulated recall), multiple data sources (questionnaires, fieldnotes, interview transcripts, audio-record of spoken discourse), and multiple analysis programs (SPSS, Soundscriber, and NVivo software) were used to collect and analyze experiential accounts of learners over the 1 year of their study at an EMI university in Asia.

Eight successive PBL tutorials were videotaped, and then significant episodes of silence in these tutorials were identified, edited, and extracted into one media file per tutorial. From the analytic perspective of CA (Sacks, Schegloff, & Jefferson, 1974), the significant episodes of silence within and between turns are mainly identified as

- silence between turns, which refers to instances when one student is involved in discussion and later withdraws, or one student is not involved in discussion but later is self-selected or nominated to talk; and
- silence within turns, which refers to instances when one student presents a piece of information and then stops talking and later continues to present.

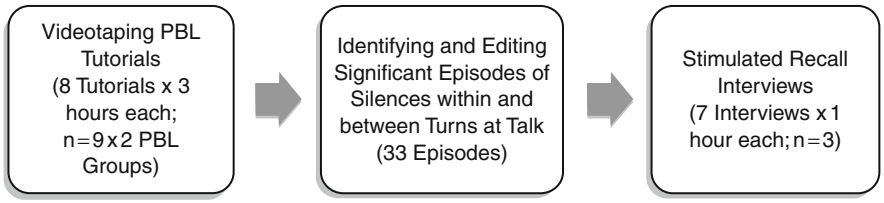

Fig. 11.1 Data collection process

Finally, three first-year undergraduate students volunteered to attend stimulated recall interviews during which they were given control of pause functions while viewing the edited excerpts and freely commenting on their own and their groups' communication processes (Gass & Mackey, 2000). The topic of silence was not introduced as a focus at the beginning of the recall session. These interviews were audio-recorded and transcribed. The process is shown in Fig. 11.1.

The analysis presented in this chapter mainly draws upon CDA focusing on one group of students' real-time interactions and uses thematic analysis focusing on two students' stimulated recall reflections, to explore both student practices and student perceptions of silence in PBL tutorials. In this CDA study of first-year dental PBL tutorials, interactional control, including turn taking, exchange structure, and topic control are the main features in PBL discourse to be examined (Fairclough, 1992). This allows insight into the actual process of classroom interaction.

11.2.2 The Research Context: PBL in Faculty of Dentistry at an EMI University in Asia

The case study reported here examined practices and perceptions of first-year undergraduate students from one discipline, dentistry, at an EMI university in Asia which has been recognized as having one of the closest models to "pure" PBL in dentistry (Winning & Townsend, 2007). The PBL process adopted is illustrated in Fig. 11.2:

Data presented in this chapter focuses on one set of participants from the larger study. The consenting tutorial group (8 students) and their facilitator were video-recorded four times during the second semester of their first year of

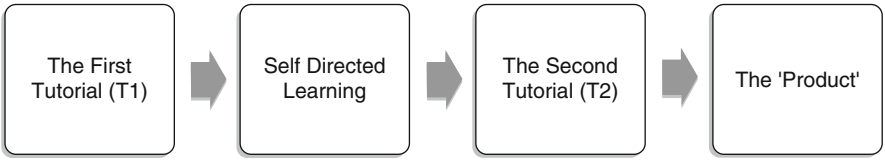

Fig. 11.2 PBL procedure

Table 11.1 PBL group A students' background

Name	Gender	Entrance pathway	Education background
Jessica	F	Non-JUPAS	First degree holder from a local university
Catherine	F	JUPAS	Local secondary school
Roy	M	Non-JUPAS	First degree holder from an overseas university
David	M	JUPAS	Local secondary school
Stephan	M	Non-JUPAS	Local secondary school
Joan	F	EAS	Local secondary school
William	M	JUPAS	Secondary school overseas
Julie	F	Non-JUPAS	Secondary school overseas
Facilitator	F	N/A	N/A

JUPAS denotes joint university programmes admissions system. JUPAS is the main route of application designed to assist local secondary school students to apply for admission to nine government-funded universities
EAS denotes early admission scheme. EAS is a subsystem of the JUPAS. It enables very able students to enter three universities one year earlier without sitting for the A-Level exams

undergraduate studies. The students knew each other previously but this was the first occasion in which they worked as one PBL group. The participants are referred to by pseudonyms throughout. Although these students were in the first year of their studies and had only completed one semester of PBL, they demonstrated a clear familiarity with the requirements and processes of PBL in the faculty. A brief summary of the participants and their backgrounds is provided in Table 11.1.

All participants' first language is Cantonese, but there were variations among students as shown in Table 11.1: different entrance pathways (e.g., JUPAS, non-JUPAS, EAS) and different educational backgrounds (e.g., local secondary schools, overseas secondary schools, first degree holders from a local university, and first degree holders from an overseas university). These variations among students may have impacted on the variability and complexity of spoken English during PBL tutorials in this EMI context. While not aiming to track this issue in detail here, it is worth noting that in an internationalized, EMI university in Asia, while students have obviously met threshold language requirements, they have experienced multiple tertiary entrance pathways and have had different English language acquisition backgrounds upon entry to first year studies. This study seeks to explore these diverse students' perceptions and practice of silence in spoken English interaction.

11.3 Analysis

The data analysis informs the different roles of silence in spoken English interaction in PBL tutorials at an EMI university in Asia. First, students' different perceptions of silence in PBL groups are indicated. Then, their practices of silence are presented in detail, using discourse-based analysis with stimulated recall interviews as reflective supplements.

11.3.1 Perceptions of Silence

In this Faculty of Dentistry, relatively silent students were readily identified by individuals themselves and by their group members.

> In groups, there are always one or two people who prefer to be more quiet about things. (Post-survey interview, 10/03/2009, William)

However, besides allowing for the casting of members as silent and seeing this reflected in tutorials, it was recognized that silence was, in fact, not unusual in the group discussion among group members in every tutorial.

> One of our group mates may ask questions then nobody knows how to answer it. This is quite usual actually, and it happens in every tutorial. (Post-survey interview, 13/02/2009, Stephan)

Later in the year, while watching the video playback of one tutorial, the same student offered some reasons for his own silence,

> I was sick during the week, so actually I didn't prepare anything except the sleeping issue. I couldn't contribute much before that topic, and that was why I kept quiet at very beginning of T2. (Stimulated Recall Interview, Problem 1.21 T2, 29/04/2009, William)

As participants of an educational community of practice, students inherently understood the "rules of the game" and how breaches would affect interactional dynamics, individual learning, and group learning. To engage in the PBL process, students need to be well prepared before the second tutorial (T2), so that they can make a contribution to group discussion. If students are not familiar with topics, they appear to verbally disengage in the discussion and remain silent, showing a reluctance to display knowledge gaps or lack of preparation. Another student from the same group, Stephan, also had a similar reflection on his own performance,

> If I prepare quite well in this part, I can just use my knowledge to answer others' judges and questions immediately. If I am not so sure about the topics, like thermodynamics, because I haven't got enough time (in self-directed learning period), then I won't speak much actually (in PBL tutorials). (Stimulated Recall Interview, Problem 1.21 T2, 27/04/2009, Stephan)

Students' reflections above indicated the obvious link between silence and lack of knowledge. If they perceive that they do not have anything to contribute as a knowledge display in the final tutorial, they do not speak. This finding is consistent with many other studies (e.g., Jackson, 2002; Nakane, 2005; Phillips, 1972), which found that Asian students who were reluctant to engage in discussion were influenced by contextual factors such as the topic in discussion. However, among this group of undergraduate students, silence was perceived and practiced in other ways. It may seem obvious that in PBL tutorials, as in many leaning contexts, students need silent time to listen, digest, judge information, and generate new ideas. From this lens, rather than being viewed as a

negative phenomenon, silence becomes a productive resource. Students' reflections below present how silence in spoken English interaction is used as a productive resource.

> If I do not prepare well, I try to learn from and listen from others, instead of speaking. (Stimulated Recall Interview, Problem, 1.21 T1, 27/04/2009, Stephan)

In PBL tutorials, Stephen reflected that he listened in the process of solving problems even if he remained silent in discussion. Judging the information while being silent was another productive way to participate in the group discussion:

> I was just digesting the information as we had two versions at that moment. (Stimulated Recall Problem, 1.21 T2, 27/04/2009, Stephan)

William's reflections further indicate that he considered himself still actively participating by other means, e.g., active thinking.

> I was thinking the proposal might not be reasonable. In my mind there was another theory. It might be wrong cause I hadn't proved it yet. When he told me that, it didn't make sense, so I was judging, just matching my knowledge. (Stimulated Recall Interview, Problem 1.21 T2, 29/04/2009, William)

Besides judging and integrating knowledge within personal mental constructs, William reflected that he tried to generate new ideas so that the group discussion could move forward.

> I was checking if there was any facts we've missed, so I could generate new ideas. (Stimulated Recall Interview, Problem 1.21 T1, 29/04/2009, William)

Besides listening and active thinking, students may keep silent in order to wait for peer feedback; find a chance to talk; or open the "floor" to others for better knowledge construction and group dynamics in the collaborative learning procedure. The extracts of one group tutorial and its associated stimulated recall interviews (Section 11.3.2) present how silence is used as a collaborative practice.

11.3.2 Practices of Silence

Extract 1 'Problem 1.21' T2 24/04/2009

In this second tutorial, students were discussing the last learning issue identified in the first tutorial (T1)—physiology of sleep. This extract presents William sharing his previous projects about sleep. The facilitator asked a question to the group (Turn 1) and William's response of "no" elicited different responses from group members. The long pause at Turn 2, David's question at Turn 3, and Stephan's hesitation indicate some confusion. After William took the extended turn at Turn 7 to share his previous research project, group members sought clarifications. William then took this as indication to elaborate and share his information further (Turn 19).

Turn	Participant	Content
1	Facilitator	So if you prescribe sleeping pills, what would happen? Should they produce serotonin?=
2	William	=No (3.0)
3	David	What? ((David looks directly at William))
4	Stephan	Hu::h::sleep.
5	William	We::ll let me share my research.
6	Stephan	Mm
7	William	Why do we feel we really should sleep? There are actually two (.) separate mechanisms to monitor. One is serotonin level. It develops continued concentration all the day, so (.) when it is low, you awaken (.) and (.) you continue to build up during the day. And as you keep awake, you keep developing until certain percentage level, then you feel really sleepy and you fall asleep. And during sleeping these chemicals will be broken down. So (.) after sleeping, the level is lower enough to be awoken. The second mechanism is melatonin. What is melatonin? It is actually another kind of hormone that promotes sleeping. It is in the deep production that is inhibited under sunlight, that is why you can rarely fall asleep under sunlight and easily fall asleep at night, because (.) daylight can inhibit the production of melatonin. So (.) serotonin is so called "biological clock," it is the biological clock we have been discussing. And melatonin is hu::h time and daylight dependent. And all these two mechanisms make the sleeping habit. (2.0)
8	David	How do you spell melatonin?
9	William	M-E-L-A-T-O-N-I-N
10	Facilitator	M-E-L-A-T-O-N-I-N
11	David	Accumulate?
12	William	Accumulate.
13	Facilitator	Does it have anything to do with the circadian rhythm?
14	Stephan	Sorry?
15	Facilitator	Circadian rhythm (2.0)
16	David	Circadian rhythm
17	Facilitator	Circadian rhythm is the biological clock. (2.0)
18	Stephan	So that is why (.) hu::h if you have awaken for a day, then your body has concentrated very high level of serotonin, then you (.) want to sleep very much. (2.0)
19	William	And perhaps the other mode of sleeping varies from person to person, from 5 to 10 h, so if you can fall asleep during lectures, that means you have sleep depression =
20	Stephan	= Sorry?

In this collaborative and scaffolding process, William answered the question (Turn 2), then remained silent (Turn 3 and 4), and later took turns to share the information (Turn 5–7). From the turn-taking pattern after his extended Turn 7, it would appear that William's participation in the ensuing turns was dependent upon the group's reaction to this display and so he offered clarification or elaboration based on peer feedback. If other group members would like to ask questions, William would share more information; if they were not interested in it, he would stop. As William reflected in stimulated recall interview,

> Actually I was waiting for someone, waiting for their speaking. Because I said "no," it seemed to surprise them, didn't it? Because David stopped talking, doesn't he? And the facilitator asked him if he is going to prescribe sleeping pills, if he is to prescribe serotonin. That might sound "yes" logically, but it doesn't. Then that might be a surprise to them. Maybe they would like to ask questions, if they are not interested, then don't talk, right? So if they want to know, I give them more information. Maybe they don't want to know, oh that is ok. (Stimulated Recall Interview, Problem 1.21 T2, 29/04/2009, William)

In response to David and Stephan's surprised responses (Turn 3 & 4), William was willing to share more information about sleeping (Turn 7). William further explained the reason why he waited for peer feedback in this discussion.

> It would be too deep for that. Because it is psychologically based, if you did not fancy psychology, you might not want to know about the mechanism of sleeping. (Stimulated Recall Interview, Problem 1.21 T2, 29/04/2009, William)

The stimulated recall interview prompted William to disclose the delicate tension of knowledge display turns with regard to extent and depth of information. Since he was concerned that other group members might not want to know psychological information, which was not related to the dental field, he reflected his hesitation to elaborate and these concerns of peer feedback seem to have influenced the turn-taking pattern and topic of the discussion from Turn 8–23. When other group members including the facilitator showed interest in this topic by asking questions (Turn 8, 13), seeking clarification (Turn 20), and digesting the information (Turn 11, 18), William then heard this as an invitation to share more information on the topic (Turn 19). Thus, silence is delicately employed here in the group learning process as a collaborative practice to wait for peer feedback in order to construct knowledge and scaffold group learning.

In this extract, William presented as being "a specialist" having specific knowledge about physiology of sleep and so the distribution of turn taking between William and other students was unequal. William was sure about the information and had supporting evidence, so he could take up authority and his group position was more powerful thereby giving him license to present the information. No other member took the opportunity in this exchange to challenge his knowledge and the rights of turn taking and topic control. Therefore, silence may also be regarded as a signal of shifting power relations in the learning process.

What is of interest here is how these processes are played out in small-group PBL as students worked collaboratively to construct knowledge in the process of understanding and seeking solutions to problems. It is also common in PBL tutorials that students may have different understandings of knowledge, and have different preferences topically with regard to learning issues:Which learning issues shall be identified? Which version of knowledge is correct? Silence is used as a platform for handling conflicting understandings so that students can think critically, recheck the information, and find the evidence to support their own statements. The extracts from the same group's second tutorial and the

same two students' stimulated reflection below reinforces how silence in spoken English interaction is used as a platform for handling conflict.

Extract 2 'Problem 1.21' T2 24/04/2009

Students discuss the learning issue "physiology of sleeping." In this extract, after Stephan and Jessica elaborate on the two main types of sleep (Turn 1 and 5), Stephan and William display different understandings of REM sleep and debate if there is movement in REM sleep. Eventually, their arguments promote the whole group to a better understanding of REM sleep.

Turn	Participant	Discussion
1	Stephan	We::ll sleep can be classified into two main types. (.) Non-rapid eye movement and rapid eye movement sleep= ((Jessica and Catherine are looking at their materials and William is looking at his laptop))
2	Jessica	= Um huh = ((looking at her books))
3	David	= Rapid eye movement. ((to Jessica))
4	Stephan	[Right]
5	Jessica	[So there is two] (.) yeah, one is slow wave sleep and one is REM sleep, REM sleep means rapid eye movement sleep.
6	David	Um huh, ok. ((to his own book))
7	Stephan	So slow wave sleep=
8	Facilitator	=Have you watched other people have REM? Have you ever seen=
9	William	=Yeah, I do.
10	Stephan	Yeah, wave a lot. ((Stephan is waving his hands))
11	Facilitator	[No, not moving a lot.]
12	William	[No, no.]
13	Roy	The eye:: [the eye::]
14	Stephan	[Huh?]
15	William	[No.] During REM sleep, you're technically paralyzed=
16	Stephan	=Really?=
17	William	=No movement. (9.0) ((every group member is checking the books or laptops))

In this extract, this group discussion is dominated by students, with the facilitator taking a traditional PBL "back seat" role. Agreement and disagreement are commonly displayed across students' turn taking. From the stimulated recall interview, while Stephan elaborates on the type of sleep (Turn 1), William did not agree. However he did not say anything but looked at his laptop to check his previous project in order to recheck the information and match his own knowledge. When watching this replayed on video, William reflected,

> What Stephan said is half right, half wrong, so I check my previous project work, to recheck and match my knowledge. (Stimulated Recall Interview, Problem 1.21 T2, 29/04/2009, William)

When Stephan and William had contradictory understandings of REM sleep (Turn 10–17), every group member verbally disengaged from the group

discussion for 9 seconds to conduct individual research by using mediating tools (Vygotsky, 1978)—books, notes, or online information—on their laptops (Turn 17), in order to find related information to make a judgment regarding whose statement is correct or sensible, as well as formulate the possible solutions. Stephan briefly expressed his doubt "really?" (Turn 16), but he didn't immediately argue with William. Instead, he checked his book. As Stephan reflected later,

> (I'm) completely lost. After I give this information out, then he is saying "no." So this is the point that I ask myself what's happening, if I have read something wrong? Or have I misinterpreted something? (.) Or anything else is happening? So I try to read the book to reassure myself if I'm correct. (Stimulated Recall Interview, Problem 1.21 T2, 27/04/2009, Stephan)

Here both William and Stephan remained silent to look for evidence in order to support their statements. Their stimulated recall interviews further confirmed that this silence was used as a productive resource within the tutorial. Other group members also looked for the information through mediated tools to make a judgment and formulate a possible solution (Turn 17). Such collective activity seems to have been undertaken as implicitly sanctioned which appears to indicate silence in the group discussion was acceptable.

Every group member discussed freely the issue of REM sleep and elaborated their different understandings, but we need to notice that delicate power relations were shifting over the discussion. Stephan was familiar with the topic, so he elaborated on the issue of sleeping first. Jessica had information, so she had the authority to take turns to confirm Stephan's information (Turn 2 and 5). William had completed a project on sleeping when he was in the high school, so he also felt empowered to take turns to display his disagreement (Turn 12 and 15). Knowledge plays an important role in this shifting of power relations in the PBL group. When there is a conflict between group members (Turn 10–17), silence provides students with enough time to rethink, recheck, or reconfirm their knowledge and information. The conflict may then be handled if group members can set up mutual understanding of that knowledge, and construct more concrete and trustworthy knowledge in that silent time.

In summary, based on the analysis above, students' practices and perceptions of silence may be categorized into five roles in PBL tutorials:

- silence as a verbal disengagement (e.g., lack of knowledge, non- preparation);
- silence as a productive resource (e.g., recalling long-term and short-term prior information, digesting information, information seeking, generating new ideas);
- silence as a collaborative practice (e.g., waiting for feedback);
- silence as a platform of handling conflicting understandings (e.g., thinking critically, rechecking the information, and finding supporting evidence)
- silence as a signal of shifting power relations (e.g., unequal turn-taking distribution, topic control)

These five roles of silence are separately identified, but it needs to be noted that they may overlap. For example, in both of the excerpts above, students remained silent due to a lack of knowledge, but at the same time they indicated that they used silence as a productive resource to digest other students' information or search information.

11.4 Discussion

Jaworski and Sachdev (2004) noted that the different valuation of talk and silence is that silence, when it is mentioned in terms of academic achievement, is usually perceived negatively much more often than positively while talk is never viewed negatively in the same context. However, the analysis above indicates that silence cannot be simply stereotyped as a negative phenomenon. The findings of this study indicate that even though "absence of sound" or "inaction" can routinely be observed in learning interactions, this silence can be portrayed as a means of communication, participation, and learning in the ongoing process of PBL. Halth-Cooper (2003) reported that tutors felt that students could actively participate when they did not actually speak in PBL tutorials. Remedios, Clarke, and Hawthorne (2009) investigated four silent PBL students' experience in an Australian university. They indicated that multiple constraints, including personal, contextual, and cultural factors, resulted in students' silence, and silence should not be viewed as lack of learning. These findings are confirmed in the PBL discourse and students' stimulated recall interview data in this study in an EMI context in Asia: silence is not merely a verbal disengagement in the group learning process, but importantly also a productive resource, a collaborative practice, a platform of handling conflict, and a signal of shifting power relations.

If we are to acknowledge that silence is co-constructed as a productive resource in ongoing negotiation of participation in the academic communication, we need to be aware of toleration levels for silence in spoken English interaction in PBL tutorials. Although tolerating silence for a long period may inhibit the learning process, or mean a considerable loss of fun and motivation in PBL (Bosse, Huwendiek, Skelin, Kirschfink, & Nikendei, 2010), it is valuable that facilitators and students allow or tolerate silence in the discussion before intervening in the group process. Thus, it is essential to realize the different roles of silence in the ongoing learning process and educate facilitators and students in understanding the roles of silence in PBL facilitation in order to better facilitate or participate in the learning process.

As noted in Section 11.1.3, the average timing in turn taking in natural conversation in English is around one second (Jefferson, 1989), but it appears that longer silent episodes may be acceptable in PBL tutorials. From the two tutorial transcriptions reported here, the range was between 2 and 9 s. In studies of didactic teaching approaches, Nakane (2005) recommended that allowing

longer wait-time after questioning could improve the participation of Japanese students. Rowe (1974) had earlier suggested that increasing wait-time in instruction from around 1 s to 3–5 s improved the quality of participation in the class. Therefore, both facilitators and students need to consider the wait-time in discussion according to the situated context, in order to promote knowledge construction and effective group dynamics.

Moreover, as noted in the introduction, communicative competence (Jackson, 2005), lack of opportunity to practice oral English (Jackson, 2005; Littlewood et al., 1996; Tang, 2007), and cultural differences (Flowerdew & Miller, 1995; Lee, 1999), have been the main factors identified as resulting in students' silence in interaction. However, the context of the current study did not support these three factors as main obstacles for students in PBL tutorials. This EMI university in Asia, as a prestigious international university with a multicultural and multilingual community, has affirmed the important role of language in education, and recommended that English should be the *lingua franca* for all formal and informal communication throughout the university. One aim of the pedagogical approaches in this undergraduate dental curriculum is to encourage effective oral communication, and this is particularly enacted in PBL tutorials. In this study, all of the group members were ethnic Chinese with various educational backgrounds, including immersion in pretertiary and tertiary education in English-dominant countries. Therefore, the lack of opportunity to practice oral English and cultural difference may not be main factors affecting Chinese students' silence in PBL tutorials in this second-language context. As discussed earlier, it can be dangerous to over-generalize Asian students' silence. This study has taken up the call to understand individuals in situated contexts rather than as members of a cultural group (e.g., Cheng, 2000; Kubota & Lehner, 2004). Other factors, such as knowledge (Zhou et al., 2005), identity (Duff, 2002), power relations (Leki, 2001; Morita, 2004), and interpersonal relations (Cheng, 2000; Kubota & Lehner, 2004; Wong, 2004) should be considered to more fully explore spoken English interaction in higher education.

In addition to the roles of silence, it may seem obvious for those familiar with PBL curricula that in the above data the facilitator took up the role of "guide" and students took up an "active learning" ethos. The facilitator did not dominate the group interaction by controlling the turn-taking exchanges but rather accepted the defined PBL role and relinquished interactional control to the group process, giving the "floor" to students and thereby enabling co-construction of knowledge. In this study, students dominated collaborative discussions, and their talk flowed freely while focusing on the main issues while shifting across a series of interconnected topics. This finding is not consistent with many research studies on Chinese students in higher education (e.g. Jones, 1999; Littlewood et al., 1996), which were inclined to stereotype them as reticent and even passive participants during discussions. Analysis of data from this study indicates these participants to be highly active co-constructors of knowledge in an English-medium context. These students were skilled at

collaboration and handling conflict among group members in order to construct knowledge, set up mutual understanding, and work toward understanding the problem, in a cooperative and supportive way.

11.5 Conclusions and Limitations

In summary, in this discourse-based study of first-year dental PBL tutorials, findings reinforce previous studies that small-group discussion in PBL opens opportunities for students' knowledge construction, skills development, language engagement, and group collaboration in the rich-language environment. Analysis focusing on the issue of silence in spoken English interaction indicates that students' silence performs specific roles in group communication and learning. Data analysis indicates that silence is perceived and practiced not merely as a verbal disengagement, but importantly also as a productive resource, a collaborative practice, a platform for handling conflicting understandings, and a signal of shifting power relations.

The implications of this research are that these perceptions and practices of silence in spoken English interaction are likely to affect group dynamics and knowledge construction in PBL tutorials, particularly given the high level of knowledge and communicative demand in small-group learning in multilingual contexts.

The small sample size might limit the generalizability in this study, but these findings may resonate with small-group learning in other contexts.

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