Relying on students to construct science for themselves: Japanese way of nurturing independent learners in elementary school classroom

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This paper investigates the classroom practices supportive for nurturing independent science learners by analyzing two main elements of the lesson i.e. Questioning and Teacher Talk (TT) as teaching skill. For the data used in the study, the results showed that questions asked were of higher level and probing by type, while Teacher Talk was mainly focused on mediating student's observation and connecting varying thought held by the students. Thus the learners who have independent view of science and construct knowledge for them are produced.

Key words: science teaching, constructivism, Japanese education, and elementary education

According to the Program for International Student Assessment (PISA) in 2000, Japanese children, when compared with their counterparts in other countries of the world exhibited higher degree of understanding of scientific concepts, capacity to apply learned knowledge in different perspectives and ability to draw evidence based conclusion on the questions relating to application of scientific concepts to natural world and related human activities The success story is assumed to be because of the flexibility and freedom, in which elementary school education is conducted. Therefore it is important to investigate and improve the teaching style of Japanese teacher making this happen.

I. Objectives:

This research addresses the following: a) Teacher's questioning as a mean of construction of knowledge b) Teachers Talk as a source of mediation and support to lead students towards their classroom learning

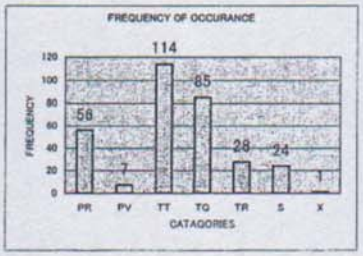
II. Methodology:

The sample included the 5th graders from one of the attached schools of Tokyo Gakugei University. The classes for the unit "Germination and Growth" were observed and recorded for a period of two months (16 class hours i.e. 8 lessons). Considering the large quantity of the data, one lesson (7th &8th class hour) was selected for analysis considering the best possible representation of the customary elementary school science class of Japanese schools.

Brown's Interaction Analysis System (BIAS) was used to classify the classroom protocol into seven categories (For details see Brown, 1975:pp. 66-67) with the exception of one change in the naming of a category (Teacher Talk *TT* is used instead of Teacher Lecture *TL* to comply with the objectives of the research). Teacher's questions were analyzed by using Moore's method of determining level and type of questioning (Moore, 2001: pp. 205-209). Teacher Talk and Teacher Response were analyzed using Newton's (2002) description of categories for the class talk (pp.34-50).

III. Results:

Figure 1 shows that 17.7% of the total class discourse comprised of students responding to teacher/class-fellows questions while 2.2% when students volunteered in class discussion. 36% of the time was spent on teacher talk.



TT: Teacher Talk *TQ*: Teacher Questions *TR*: Teacher Response *PR*: Pupil Response *PV*: Pupil Volunteer *S*: Silence *X*: Unclassified

Figure 1: BIAS analysis of classroom protocol

Teacher questions are 30% and teacher response to student's questions are 8.9%. Pauses for the students to think, prepare, work individually are 7.6%. These quantitative divisions of discourse pattern only presents partial picture of the classroom conduct. Further investigation is done to have full picture by analyzing the nature of questions and class talk.

Key characteristics of the Questions asked: Table 1 shows that 33% (28/85) questions fit in categories below while remaining 67% were the questions not asking any specific student to respond but providing ideas for thinking and responding. 75 % (21/28) of the questions were addressing the higher order skills like analysis of the given information (empirical), thinking creatively to produce something new (productive) and making judgments values (evaluative).

Table 1: teacher questions by level & type

Level/ Qu. Type	F	E	P	E	Total
Focusing	4	4	1	0	9 (32%)
Prompting	0	0	1	1	2 (7%)
Probing	3	8	0	6	17(61%)
Total	7 (25%)	12 (43%)	2 (7%)	7 (25%)	28

F: Factual E: Empirical P: Productive E: Evaluative

By type, almost 61% of the questions were meant to probe further the explanations suggested by the students. This is followed by 32% of the questions bringing students attention to the object of the learning and taking them in the context.

Analysis of class talk: In this particular lesson class talk was dominated by Connecting Talk (56.5%) which shows that the teacher spent more than half of his talk time for facilitating the class discussion and plays the role of a mediator. followed by a good deal of time is spent on Monitoring Talk (33.9%) helping students to criticize, appreciate and reflect on their own method of learning and outcomes. The little time for Tuning Talk (9.7%) in this particular lesson is because this lesson was a continuation of previous lesson and students were already tuned to the subject.

IV. Discussion:

One prominent feature observed in the Japanese science class is that the students are almost free to speak their mind without any fear of being accounted for their mistakes and they realize that their opinions are always treated as valuable and form the central core of the classroom instruction.

1. Teaching Through Questioning: Usually, Japanese teacher follow-up student understanding by putting probing questions instead of declaring it correct or false. Thus leaving it to the students to judge the authenticity by them. It is sometime time consuming but a very effective mode, which helps student to make up internal discrepancies in understanding and lead to a change that is more permanent and well accepted by the individual. This implicates greater reliance on students to construct their own understanding.

2. Teacher's place in the class: Teacher Talk analysis showed that teachers build class activities as the students' discussion unfolds the need and dimension. Teachers job is mainly to ensure the participation of all students and keep students away from being distracted from the goal of the lesson. Another important feature is the continuous monitoring which equip the teacher with better understanding of students' progress.

3. Where the instruction lies? The academic freedom and flexibility allows teachers to draw out the wisdom already embedded in the students through providing the suitable input and environment. The shown respect and value for student opinion helps in culminating self-confidence in students while provides opportunity for teachers to listen to what students already know and think. Thus building the conduct of the lesson on the ideas put forward by the students becomes a source of self-confidence for the students. An impression is intentionally developed among the students that they are determining the course of their learning while they are being tactically guided to follow a pre-determined objective in the mind of the teacher. The teacher does make adaptation in the course but not in the destination. The evidence is seen in the questioning and teacher talk, where teacher seems to be just arranging and ordering the students expressions but in fact he shapes his question in a way that help students to judge the validity of their conceptual structures. He focuses on the inconsistencies and gaps in the students' reasoning thus urging them for modification or reshaping of their conceptual constructions.

References

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