Investigating learning support in science classroom during lesson study for a learning community

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Abstract. Teacher and peers provide students with multiple learning support that promote social and academic engagement. How to provide appropriate support to student learning is one of focus in lesson study for learning community (LSLC). LSLC emphasizes on reciprocity among student and also between teacher and children. This paper aims to identify profile of learning support during LSLC and analyse the impact of post-lesson discussion to learning support. Research method used in the study is descriptive qualitative. The study was carried out in science lesson which consist of three different science topics. Samples were collected through three videotaped LSLC cycle and those are analysed qualitatively. Required data in this study were field note, transcript of research lesson and transcript post-lesson discussion. The findings in this paper illustrate that during LSLC are 1) post-lesson discussion affect to teachers’ initiative in organizing learning support 2) teachers’ support influence how student provide support to their peers.

1. Introduction

National curriculum in Indonesia suggest science teacher to create student centered learning. Bransford suggests that student centered learning can activate student interaction [1]. Student centered learning use constructivist paradigm. In student centered learning, knowledge is constructed together by teacher and student, so it is not just transfer of knowledge [2]. Transcript based analysis reveal that science learning in one of school in West Java was not categorized as student centered.

Learning support occurred during lesson will promote academic achievement, student motivation and social engagement [3-6]. When teacher cannot frame out learning support during lesson, it will effect on learning tendency, weather teacher centered or student centered. Teacher and student as part of classroom social environment can provide multiple support that influence to students’ social and academic engagement. Learning support was kind of social support that aim to replace students’ problem by building positive and supportive culture [7]. Learning support has 4 categories [3]. Those are academic support, emotional support, promoting mutual respect (mutual respect support) and promoting interaction (interaction support).
Lesson Study for Learning Community (LSLC) is known as approach to shifting from the one-way learning format to democratic learning (teacher centered to student centered). LSLC focus on creating reciprocity learning among student and between teacher and children [8]. It is point out that providing appropriate support to student learning is one of focus in LSLC. In the present study, we attempt to address following question: 1) how is profile of learning support in science lesson during LSLC cycle? 2) How post-lesson discussion impact to learning support?

2. Method
This study aims to identify profile of learning support during lesson study and the impact of post-lesson discussion to learning support. In order to achieve the goal, researcher use descriptive qualitative method. Participants were 32 seven grade students in private School in Bandung. The school has conducted LSLC since 2015. Data were gathered in three science classes taught by female teacher. The teacher has taught science for 6 years. Data was carried out based on Lesson Study for a Learning Community (LSLC) cycle. In LSLC, researcher observes research lesson and conducting post lesson discussion with teacher. Observer join research lesson were another science teacher, teacher beyond the subject boundaries (non-science teacher) and teacher educator. In the end of the study, the teacher was interviewed to gain teacher perspective about their learning support and LSLC. The table of study procedure is shown in table 1.

| Data Collection Technic | Data Collected                                      |
|------------------------|----------------------------------------------------|
| Documentation          | • Video of research lesson                         |
|                        | • Transcript of research lesson                    |
|                        | • Video of post-lesson discussion                  |
|                        | • Transcript of post-lesson discussion             |
| Observation            | • Researchers’ field notes                         |
| Interview              | • Audio of teacher interviewed                     |

In order to achieve the goal, data were analyzed qualitatively. Video and audio of research lesson and post-lesson discussion were transcribed, filtered and coded. The unit of coding used in this study is Locus, consisting of set of teachers’ talk and student talk or just two or more students talk. Locus was categorized based on rubric that researcher adopt for Positive Behavior Support (PBS) instrument [3, 7].

3. Result and discussion
Transcript of research lesson was analyzed to uncover type of learning support during science class. Coding of the transcript were categorized into four types of teachers’ support, those are academic support, emotional support, promoting mutual respect (mutual respect support) and promoting interaction (interaction support). The result of analysis shown by figure 1. Figure 1 show that classroom social environment was such a dynamic environment. There is a shifting total of type of learning support in each meeting.
Figure 1 show that there is an improvement of learning support that provide by teacher in each lesson. Academic support has changed gradually. Academic supports conducted were 1) clarify about student misconception 2) illustrate an analogy of an abstract concept 3) invite student to predict experiment 4) extend student understanding by imply their knowledge on different context. Figure 1 indicate that academic support on 3rd lesson was lower than academic lesson on 2nd lesson, meanwhile, the support that promote student interaction was increased in great degree. Facing this situation researcher realize that academic support and interaction support may have relation. Transcript based analysis showed that in the 3rd meeting teacher try to substitute teacher academic support with student academic support. Teacher activate student academic support by promote interaction support by eliciting more student opinion.

Here we will discuss about the deeper investigation that reveal profile of learning support conducted in Heat Capacity lesson, shown by Table 2. Academic support categorized weather that was appropriate or not based on student response. From transcript-based analysis, academic support emerged were Teachers’ Prediction (TP), Teachers’ Question (TQ), Teachers’ Request (TR), Teachers’ Direction (TD), Teachers’ Confirmation (TC), Teachers’ Evaluation (TE) and Teachers’ Analogy (TA). Based on student response, there were some support that appropriate, we name it as function support and malfunction support for non-appropriate support.

Table 2. Percentage of function and malfunction support in heat capacity lesson.

| Type of Acad Support | Function | Percentage |
|----------------------|----------|------------|
|                      | TP       | TQ         |
|                      | 2.4%     | 14.6%      |
|                      | TI       | 18.3%      |
|                      | TR       | 15.9%      |
|                      | TD       | 2.4%       |
|                      | TC       | 1.2%       |
|                      | TE       | 1.2%       |
|                      | TA       | 1.2%       |
|                      | Malfunction |        |
|                      | 0.0%     | 12.2%      |
|                      | TI       | 22.0%      |
|                      | TR       | 0.0%       |
|                      | TD       | 3.7%       |
|                      | TC       | 0.0%       |
|                      | TE       | 0.0%       |
|                      | TA       | 4.9%       |

Table 2 show that lesson was dominated by Malfunction Teachers’ Instruction. Malfunction teachers’ instructions occurred on lesson were, First, teachers’ misconception on heat capacity concept. Teacher explanation indicate that teacher cannot differ heat capacity, specific heat and heat. Second, teacher use abstract analogy to help student understand heat capacity concept. Teacher use greedy properties in explaining heat explanation. Third, teacher explain concept or experiment procedure while student doing their work, so it was disturbing and not effected. Forth, teacher give malfunction support when explaining that 20 grams oil equal with 25 ml oil. teacher relate these concepts with mass not density.

Beside those four malfunction supports, there are also malfunction support in interaction support occurred during lesson. During heat capacity lesson, there were student who enquire the meaning of question in worksheet, but without listening carefully what’s going in the group teacher directly respond and request her to discuss with her group (see figure 2 A). Teacher seems did not recognize the condition
of the group. And when group discussion the student imitates teacher feedback when her friend request for help (see figure 2B). In order to respond question teacher has to listening student voice, learning direction of student question and learning to frame teacher feedback while listening student voice [9]. Based on this fact researcher suggest that there was a relation between how teacher support student and how student helps peers.

| During group discussion | S2 ask question to S1's group |
|-------------------------|-------------------------------|
| S1: *miss, how about this one (inaudible)?* | S2: Nikita, how to solve number 7? |
| *T: please discuss with your friend first.* | *S1: have you discuss with your friend?* |
|                           | *S2: (inaudible)*             |
|                           | *S1: discuss with your friend!* |

**Figure 2A.** Dialogue teacher-student enquire meaning of question.

**Figure 2B.** Dialogue student-student request for help.

After every lesson observer and model teacher did a post-lesson discussion to examine learning support occurred. Observer give their opinion in order to improve learning quality. If we examine transcript of lesson we see that there is some support initiated from post lesson discussion, there are 1) clarification misconception in reading thermometer scale 2) explanation difference between graph and diagram 3) invitation to read and ask question about procedure of experiment 4) attempt to increase student independency. Those lists of support were suggested by novice teacher in post lesson discussion. From that analysis we can report that post-lesson discussion affects to teachers’ initiative in organize learning support. As Rock and Wilson and Saito pointed out that from post lesson discussion teacher can develop new understanding by observing a research lesson, analyse student thinking, receive feedback from observer and develop their views to learning [10, 11]. The finding shows that post lesson discussion as part of LSLC cycle can help in revising pedagogical styles [11].

4. Conclusion

In conclusion, the author would like to make the following point. First, academic support occurred during lesson was dominated by teacher instruction. Second, teachers’ support influence how student provide support to their peers. So, it is important for teacher to provide appropriate support so it can promote social and academic engagement. Third, post-lesson discussion as part of LSLC cycle affect to teachers’ initiative in organize learning support. By doing LSLC, there might be revising of teacher pedagogical style that will nurture student.

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