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## THE IMPROVEMENT OF COMPREHENSION ON BIOLOGY RESEARCH METHODOLOGY THROUGH WRITING RESEARCH PROPOSAL RETROSPECTIVELY BY COMBINING CLASSROOM DISCUSSION AND COLLABORATIVE WORKING GROUP IN LESSON STUDY

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**Abstract:** Lesson Study (LS) was conducted aiming at: (1) describing the ideal steps in combining classroom discussion and collaborative working group in effort to improve students' comprehension on writing biology research proposal that is arranged retrospectively; (2) analyzing the improvement of students' comprehension on writing biology research proposal retrospectively by combining classroom discussion and collaborative working group (further noted as collaborative classroom discussion).

The location of LS was in Class VB and VC, incorporating fifth semester students in Biology Education Department University of Muhammadiyah Malang (UMM) Indonesia. This LS was conducted within four cycles with its main focus on concept comprehension covering three cognitive levels, namely: simple concept comprehension, concept analysis, and concept synthesis.

The findings of this current LS concluded that there were 8 activity stages in ideal syntax of collaborative classroom discussion, to name: (1) pre-condition: students were to complete collaborative working group-based assignments; (2) the lecturer explained the rules and assessment system of the discussion; (3) reorganizing seating arrangement and dividing group discussions, one presenting group and the other discussion groups; (4) positioning the students from high group in each discussion group; (5) the lecturer acted as a facilitator and was accompanied by a student-recruited note-taker; (6) conducting classroom discussion led by the facilitator; (7) the lecturer administered the assessment process; and (8) the lecturer along with students conducted reflection.

The implementation of ideal syntax of collaborative classroom discussion was proven to improve students' comprehension on biology research methodology through writing research proposal retrospectively. Collaborative classroom discussion could improve students' comprehension on biology research methodology course as the implementation of which improved cognitive processes, initiated from simple concept comprehension, concept analysis, to concept synthesis and evaluation.

**Keywords:** *lesson study, collaborative classroom discussion, concept comprehension*

### 1. INTRODUCTION

Biology Research Methodology (BRM) is a pre-requisite course to complete the study in bachelor program. The last programme of lecturing mainly concerns on the individual activity and group-based practice needing to be taken by the students on the last semester, or in other words, after completing 100 credits in total comprising BRM course. There are three last programmes, namely: Student Community Service (KKN), Internship III, and Bachelor Thesis. The curricular demand projected to the Biology Education Department of University of Muhammadiyah Malang (UMM) Indonesia requires the students to have had passed through BRM course and at least to get B.

The scoring result of BRM course gained from Biology Education Department of UMM exhibited an unequal expectancy. The result on the odd semester 2011/2012 exhibited some results as follows: students getting A score=24%, B score= 51%, C score= 19% and D score= 6%. It meant that around 25% students programming BRM course was categorized incomplete and being subject to not being able to complete their degree programme.

One of many alternatives for upgrading the score of BRM is through learning writing a research proposal retrospectively mirroring from the previous researches conducted by the prior students. The retrospective learning step is predicted to be able to provide students with the

opportunity for directly implementing any research methodology employed by the senior students in their researches. The task for writing the proposal is organized to be conducted in a group through collaborative working-based learning.

There is an assumption affirming that combination between learning retrospectively and working collaboratively can improve the comprehension on BRM course. The collaborative working-based learning constitutes the freedom allowing the students to work in a group whether it is inside or outside the classroom (Supriadi, 2012). Meanwhile, learning retrospectively on the prior research will provide the practical working empirically and methodologically. Retrospective learning is time consuming and requires many attempts since it will not suffice if it is only conducted in the classroom. Therefore, combining those learning approaches is strongly assumed to be able to provide a more democratic learning condition and ambiance in effort to exactly reach the standardization.

One of the weaknesses of collaborative learning is the shortage of learning control. Collaborative learning more and less covers the learning element for the students. As the controlling procedure for learning activity, it will require an additional method which is a classroom discussion. Through implementing the classroom discussion, a lecturer is allowed to condition the learning activity involving interaction and scientific communication (Warsono, 2012).

The remaining problem is that: "how is the procedure of combining classroom discussion and collaborative working group in effort to enhance the students comprehension on the Biology research proposal that is written retrospectively?"

## 2. RESEARCH METHOD

The activity which was aimed to overcome the problem was through making an innovation for learning development in the form of Lesson Study (LS). The activity of LS was initiated in the ninth meeting which was taken from 14 effective meetings in total, or after eight materials of BRM course were delivered. The LS activity covered three materials of BRM

course, namely: Classroom Action Research (CAR), Experimental Research Method, and Descriptive Research Method. The activity of LS took place inside and outside the classroom by applying four cycles, according to Directorate of Higher Education and Student Affairs (2011), there are three stages: Plan, Do and See.

In Plan stage, there were two main activities done at Cycle I which was the preparation and the conduct of plan. Meanwhile, for the next cycle, there was the activity of conducting the plan only. In preparing the plan, the activity was implanted on the first meeting through presenting the procedure of collaborative working group activity especially for writing the research proposal retrospectively. Besides, the classroom was divided into three major groups, they were: Group A for proposal of CAR, Group B for proposal of experimental research, and Group C for proposal of descriptive research. The Plan activity was prepared out of the classroom through implementing the collaborative working group-based learning.

The period of the collaborative working group-based learning was about eight meetings. It started from the first to the eight meeting in which every single collaborative group wrote the proposal out-of-door retrospectively without any guidance of the model lecturer and the observer. Each of group was also freed to work collaboratively, from determining the research reviewed retrospectively up to accomplishing the proposal. The task of proposal writing was to be submitted on the ninth meeting or in the first cycle of LS.

In the conduct of Plan, the LS team developed proper and desired syllabi and lesson plans of three courses. The focus on the Plan was directed on the arrangement of the learning syntax of the collaborative classroom discussion. The team comprised five lecturers of Biology Education Department of UMM.

In Do stage, the activity was conducted within four meetings out of 14 meetings in total of BRM course, exactly on the ninth meeting for Class VB and VC, tenth meeting for Class VC, and eleventh meeting for Class VC. The activity in the ninth meeting was doing classroom

discussion about the method of CAR; tenth meeting was for discussing the method of experimental research; and eleventh meeting was allocated to discuss the method of descriptive research. The method employed was collaborative classroom discussion which was a continuity of collaborative working group-based learning. The elements of the assessment included: the ability of explaining the concept, analyzing concept, and synthesizing.

In See stage, the activity was conducted after the Do stage had been accomplished. In this stage, LS team reflected to discuss the learning process. The focus which was adapted to be a reflection resource was taken from the activity of both lecturer and students when they were in the Do stage. It included: lecturer and students' activity, learning procedures, assessment process, as well as interaction and learning communication. The reflection outcome in every single cycle was going to be an input for improving the Plan stage for the succeeding cycles.

### 3. FINDINGS AND DISCUSSION

In effort to meet at the requirements for systematically displaying the results and discussion, the succeeding sub-chapter presents the results and discussion per cycle in this LS. Each cycle covered the stage of Plan, Do, See.

#### 3.1 Cycle I

**Plan.** In this stage, the team discussed the implementation of collaborative discussion in teaching CAR method. Some scenarios of teaching implementation had been agreed upon by the LS team. Those scenarios comprised: the skill in designing lesson plans and the syntax of collaborative discussion.

The skill in designing lesson plans: The main concern in this case was the formulation of basic competence. Formerly it was formulated by means of the term "understanding", but later was changed into "implementing" so as to change the standard competence in the lesson plan stating that: "Students are to implement CAR method to draft their educational research proposal". The term "implementing" is perceived cognitively higher than that of the term "understanding" (Warsono 2012). It means

that students' competence is set to be improved in the learning process.

The syntax of collaborative discussion: This agreed syntax incorporated seven stages and was arranged based upon the combination of classroom discussion and collaborative working group proposed by Warsono (2012) and Barkley (2012). Figure 1 below displays the agreed syntax of collaborative classroom discussion.

1. Pre-condition: Students are to complete collaborative working group-based assignments.
2. The lecturer explained the rules of discussion.
3. Students are to group based upon collaborative working group.
4. Students elected one moderator among them.
5. Students conducted discussion led by the chosen moderator.
6. The lecturer administered assessment.
7. The lecturer along with students did reflection.

Figure 1. The syntax of collaborative classroom discussion in cycle I.

**Do.** In this Do stage, the classroom instruction was implemented based upon the lesson plan and the syntax displayed in Picture 1 in class VC (34 students in total). By sticking to that syntax, the following discussion interaction scenarios were recorded: asking, answering, rebutting, expression opinions, and concluding before finally determining the cognitive level in each interaction (presented in Figure 2).

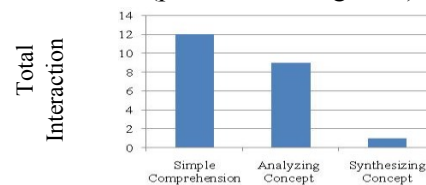


Figure 2. The number of students' interaction in class VC during collaborative discussion based on cognitive level.

It was recorded that there were 10 students who were active and involving 22 times during the discussion. It means that they interacted more than once. The category of cognitive level on the concept of CAR proposal mostly achieved by the students (recorded in 12 interactions) was on simple comprehension.

This sort of category was shown in the forms of questions and answers on one particular concept without analyzing and synthesizing methodology concepts. The second mostly achieved category by the students was analyzing the concept (accounting for 9 interactions). The least recorded category was synthesizing the concept (appearing just once).

**See.** LS team was conducting reflection upon notes and perceptions of observers in Do stage. The results were as follows: (1) the low concept understanding or cognitive level of students; (2) less conducive instructional interaction; (3) the need to develop the syntax of collaborative discussion; and (4) the need of comparing with another class.

### 3.2 Cycle II

**Plan.** In this stage, it was agreed that there would be no substantial changes on lesson plan and syllabus except for another targeted class, which was VB (42 students in total). This decision was utilized to set the result comparison between two differing classes.

**Do.** In this Do stage, the classroom instruction was implemented based upon the agreed lesson plan and the syntax. Do stage resulted in 19 students who were active in discussion communication, involving in 37 time interaction (as presented in Figure 3).

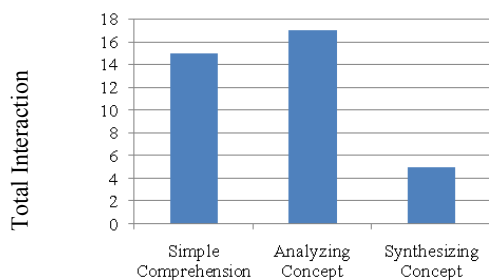


Figure 3. The number of students' interaction in class VB during collaborative discussion based on cognitive level

The category of cognitive level on the concept of CAR proposal mostly achieved by the students (recorded in 17 interactions) was on analyzing the concept. This sort of category was shown in the forms of questions and answers on

one particular concept by analyzing and synthesizing methodology concept. The sample question sounded like: "Based upon the typical CAR, why didn't your CAR syntax plan collaboration activities?" In your Chapter I, you have mentioned hypothesis, in fact it was supposed to be stated after doing literary reviews, could you justify? The second mostly achieved category by the students was on understanding the concept (accounting for 15 interactions). The least recorded category was synthesizing the concept (appearing in 5 time interaction). In general, the results for Class VC in this Cycle II improved than that of in Cycle I.

**See.** LS team was conducting reflection upon notes and perceptions of observers in Do stage. The results were as follows: (1) the concept understanding or cognitive level of students has improved from that of in Class VC; (2) the even averages of methodology concept comprehension among groups; (3) the conducive instructional interaction apart from the low number of interaction on synthesizing.

In accordance with Do and See in Cycle II, the improvement of collaborative discussion syntax was recommended for Cycle III. Those improvements covered the followings: (1) students' seating was arranged based upon groups; (2) inserting highly-achieved students into groups; (3) reducing the number of discussing group members by: one discussing group was split into two smaller groups so as to result in one presenting group and four discussing groups; and (4) the lecturer explained the research methodology before starting the discussion.

### 3.3 Cycle III

**Plan.** The main concern in this Plan stage was discussing the recommendations from Cycle II, which was improving the syntax of collaborative discussion in hope of projecting better results than that of in Cycle I. The agreed syntax of collaborative classroom discussion for Cycle I of this LS (shown in Figure 1) was improved as the one displayed in Figure 4.

1. Pre-condition: Students are to complete collaborative working group-based assignments.
2. The lecturer explained the rules and assessment of discussion.
3. Students are to seated based upon this scenario: (a) one presenting group; and (b) four discussing groups based upon collaborative working group.
4. Inserting highly-achieved students into groups
5. Students elected one moderator among them.
6. Students conducted discussion led by the chosen moderator.
7. The lecturer administered assessment.
8. The lecturer along with students did reflection.

Figure 4. The Syntax of Collaborative Classroom Discussion in Cycle III.

**Do.** In this Do stage, the classroom instruction was implemented based upon the agreed lesson plan and the syntax. The conducive interaction level in classroom instruction did not significantly differ from Cycle II. It means that the minimum accomplishment of instructional syntax has been fulfilled.

**See.** In this See stage, there was an agreement to improve the discussion conduciveness by replacing the moderator. Joyce (2009), asserts that the development of one particular question into one broader and triggering discussion topic relies upon the capacity and authority of discussion leader. Consequently, LS team proposed one model lecturer to be the discussion facilitator for the coming cycle.

### 3.4 Cycle IV

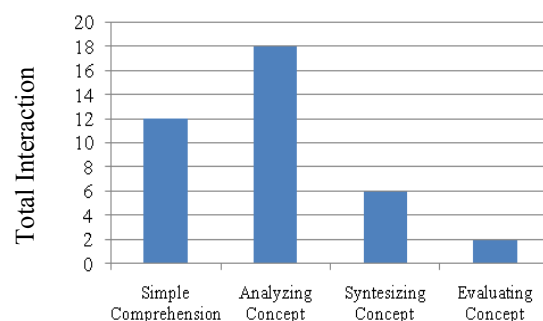
**Plan.** In this Plan stage of Cycle IV, the concerned activity was on discussing the instructional plan by employing collaborative discussion in Class VC for teaching Descriptive Research Method. The main focus was on developing the syntax of collaborative discussion in which the moderator was not taken from students but the model teacher. It was in effort to achieve better results than that of in Cycle III. The minimum target was the ideal collaborative discussion so as to compensate the

weaknesses in Cycle II and III. The agreed syntax of collaborative classroom discussion is displayed in Figure 5.

1. Pre-condition: Students are to complete collaborative working group-based assignments.
2. The lecturer explained the rules and assessment of discussion.
3. Students are to seated based upon this scenario: (a) one presenting group; and (b) four discussing groups based upon collaborative working group.
4. Inserting highly-achieved students into discussing groups
5. The lecturer was performing the role as the facilitator and accompanied by one student note-taker.
6. Students conducted discussion led by the lecturer facilitator.
7. The lecturer administered assessment.
8. The lecturer along with students did reflection.

Picture 5. The Syntax of Collaborative Classroom Discussion in Cycle IV.

**Do.** In this Do stage, the results were in the forms of discussion communication data represented by the number of students in each concept comprehension level (as shown in Figure 6).



picture 6. The number of students' interaction in class VC in each collaborative discussion based upon cognitive level.

The formation of discussion interaction results in Cycle IV differed considerably from that of in Cycle III. There was one appearing cognitive level during the instructional activities not predicted by the agreed contract, which was evaluating methodology concept. Two students

were performing this cognitive level. The number of active students improved into 20 students reaching the total of 38 time interactions.

**See.** Similar to those of in previous cycles, the See stage of this LS was conducting reflection upon notes and perceptions of observers in Do stage. Quite similar to that of in Cycle III, Cycle IV offered more advantages, namely: (1) the concept understanding or cognitive level of students has improved from that of in Cycle III; (2) there was one appearing cognitive level during the instructional activities not predicted by the agreed contract; (3) the increasing number of active students during classroom discussion; (4) there were even averages of active students in each group; and (5) there were even averages of methodology concept comprehension among groups.

Collaborative classroom discussion in Cycle IV has succeeded in eliminating the problems faced in Cycle II and III. Some problems raised by the students in the forum could trigger or inspire the development of Descriptive Research Method materials. The instructional activities have proven to be conducive, marked by the increasing numbers of interaction along with their improved quality based upon cognitive level parameter.

Apart from the already claimed conducive and quality instruction, LS team still put the role of student note-taker into an issue. During the collaborative classroom discussion, the note-taker has indeed performed the role for note-taking various interaction communications. LS team has come into the conclusion that this scenario has put the note-taker into the disadvantaged position due to not being involved in the interaction and instructional activities. How should the LS team cope with this issue? Finally, the team agreed to refer to one classical philosophy, "perfection is imperfection."

#### 4. CONCLUSION

The findings of this current LS concluded that there were 8 activity stages in ideal syntax of collaborative classroom discussion, to name: (1) pre-condition: students were to complete collaborative working group-based assignments; (2) the lecturer explained the rules and

assessment system of the discussion; (3) reorganizing seating arrangement and dividing group discussions, one presenting group and the other discussion groups; (4) positioning the students from high group (highly-achieved ones) in each discussion group; (5) the lecturer acted as a facilitator and was accompanied by a student-recruited note-taker; (6) conducting classroom discussion led by the facilitator; (7) the lecturer administered the assessment process; and (8) the lecturer along with students conducted reflection.

The implementation of the ideal syntax of the collaborative classroom discussion was able to improve the cognitive level of the students' comprehension on the concept of Biology research methodology through writing the proposal retrospectively. The implementation of the collaborative classroom discussion afforded the students' comprehension on the Biology research methodology by improving the cognitive process beginning firstly from gaining the simple understanding on one particular concept and going to the stage of analyzing, synthesizing, and evaluating the concepts.

#### 5. ACKNOWLEDGEMENTS

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