



A STUDY ABOUT TEACHING LEARNING MATHEMATICS USING STUDENT-CENTERED LEARNING (SCL) APPROACH BY HIGH SCHOOL TEACHERS IN PALEMBANG

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Abstracts

This is a descriptive qualitative study, which describes learning models implemented by mathematics teachers and the implementation of student-centered learning in mathematics classroom. This study was conducted in Palembang, especially for high school mathematics teachers. The aims of this study was to find out what kind of teaching learning models used by high school mathematics teachers in Palembang while implementing SCL, and to get a description of how the SCL approach was implemented in mathematics classroom. Data in this study were collected by using direct observation and documentation, which were used directly to see the implementation of teaching learning models by the teachers in the classroom. The result of this study shows that teachers didn't use varied teaching learning models. The teaching learning model usually used was cooperative learning. In the other hand, the implementation of teaching learning in the classroom was still dominated by the teacher in order to construct students' knowledge. Some principles of SCL hadn't been implemented by the teacher.

Key words: Student-centered learning, teaching learning models, high school mathematics teachers

BACKGROUND

Globalizations need individuals which have many capabilities in many sectors. One of institutions that prepare individuals to have a good ability and to be able to compete in a global world, schools provides competences for students which needed in many field work. Based on some competencies needed in the real work, the government makes some movements and revisions especially for the compositions of competences achieved by students in each school and each levels of schools. One of revisions in students' competencies can be found in the curriculum implemented in all levels of schools. Not only the contents which are revised, but also the approach used to transfer the content. The new curriculum implemented in Indonesian schools is named as Kurikulum Tingkat Satuan Pendidikan (KTSP) 2006.

In the new curriculum, the paradigm of teaching learning changes. Before the curriculum is implemented, the teaching learning is more focus on teacher, which is also called teacher-centered learning. Whereas, after the implementation of the curriculum, teaching and learning processes gives more focuses of students, or student-centered learning. The changing of this paradigm aims to revise the quality of teaching and learning processes, in which students will be more active, critical, self-autonomous, and having courageous to give argumentations while the student-centered learning (SCL) is implemented. In line with Brandes and Ginnis' words (1986), "with student-centered learning, students are responsible for planning the curriculum or at least they participate in choosing...the individual is 100% responsible for his own behavior, participation and learning.

The responsibility in behavior which is explained by Brandes and Ginnis means that students are expected to be more autonomous and realize that the outcome of the learning processes is very important for themselves. When students already have this behavior, the quality of the outcome in each level of educations will improve.

Based on some advantages of the implementation of student-centered learning above, it's better for teachers, especially mathematics teachers, to adopt the implementation of the approach, therefore the students' achievements in mathematics will become better. For some mathematics teachers, especially mathematics teachers in Palembang, some teaching approaches which give more focus on students have been implemented before. However, how the implementation process and the variation of the approaches used by the teachers haven't been observed deeply. There are some methods which implements SCL. Some of them are Small Group Discussions, Simulations, Discovery Learning (DL), Self Directed Learning (SDL), Cooperative Learning (CL), Collaborative Learning (CbL), Contextual Instruction (CI), Project Based Learning (PjBL), Case Based learning, Adult learning, and Problem Based Learning/Inquiry (PBL/I), etc.

Not all methods mentioned above are implemented by teachers. Therefore, in this study we want to answer some questions as what kind of teaching learning methods are implemented by high school mathematics teachers in Palembang relating to the SCL, and how do teacher implement the teaching learning approach using SCL in teaching high school mathematics in Palembang.

Student-Centered Learning

Student-centered learning (SCL) is learning activities in which students can work individually or in groups to explore problems and to find their own knowledge actively. It isn't that students only receive the knowledge passively (Harmon & Harumi, in Dikti).

There are some differences between Teacher-Centered Learning and Student-Centered Learning. The differences are shown in the Table 1 below.

Table 1. The Differences between Teacher Centered Learning and Student Centered Learning (NN, 2009)

	TRADITIONAL TEACHING (Teacher Centered Learning)	→	NEW LEARNING (Student-Centered Learning)
1	Knowledge transfer from teacher to students	→	Students actively develop their own knowledge and skills
2	Students received knowledge passively	→	Students actively build their own knowledge
3	More focus on the mastery of the contents learned	→	Not only focus on the content mastery, but also on the learning behavior (long-life learning)
4	Single media	→	Multimedia
5	Teachers give all information and are the	→	Teachers are as the motivator, facilitator, and evaluator
6	Learning process and the evaluation processes are separated	→	Learning processes and the evaluation are done continuously and integrated.
7	Only focus on correct answers.	→	Focus on learning processes. Incorrect answers can be used as learning sources
8	Only fits to the development of knowledge in one discipline	→	Fits to the development of knowledge in many disciplines
9	Learning environment tends to be individual and competitive	→	Learning environment is more collaborative, supportive, and cooperative
10	Only students are studying	→	Students together with teachers learning together to develop knowledge and skills
11	All class participations take the biggest part in the learning processes	→	Students are participating in some way using some models of SCL



12	Focus on mastery learning	→	Focus on students' achievements to some competences
13	Focus on how teachers teach	→	Focus on how students learn
14	Focus on the mastery of students hard-skills	→	Focus on the mastery of hard-skills and soft-skills

The roles of the teachers in implementing the SCL are not only to deliver or to directly give the lesson to students. The roles of the teachers are:

1. To Facilitate

In the learning processes, teachers facilitate students by providing some learning materials which can be used by students, preparing modules, hand-outs, journals, some research reports, and time for students to learn.

2. To Motivate

In implementing SCL, teachers give more attention to students, give relevant learning materials for students with their level of skills and with contextual situations. Teachers give motivations and place reliance that students can achieve some competences required. Teachers whip up students' enthusiasm so that they are more attracted and enthusiastic to learn.

3. To Give Tutorials

When students find obstacles in the learning processes, teachers help them by giving some guidance to solve the obstacles.

4. To Give Feedbacks

Teachers are always monitoring and correcting students to achieve the optimum competences.

There are some teaching learning models which are included to SCL. Some of them are small group discussion, discovery learning, individualistic learning, cooperative learning, collaborative learning, competitive learning, active learning, self-directed learning, autonomous learning, project based learning, adult learning, and problem based learning (PBL).

RESEARCH METHODOLOGY

This is a qualitative descriptive study with three subjects studied, that are three mathematics teachers. Two teachers are mathematics teachers from SMAN 3 Palembang, and one mathematics teacher from SMAN 12 Palembang. Data are collected by using direct observation and documentation. Observation is used to observe the process of teaching learning by the teacher in the classroom. The observation data are recorded by using video recorder. Field notes and documentations are used to support some findings during the observation.

RESULTS AND ANALYSIS

1. Teaching Methods Implemented by Teachers

The first teacher used cooperative learning for the first teaching observation. The topic discussed were linear equations with two variables. In the second observation, the teacher used cooperative learning type Jigsaw.

The second teacher used cooperative learning in the first and second teaching observations. The topic discussed in the first observation was linear equation with two variables, while in the second observation was linear equations with three variables.

2. Teaching Learning Processes



The first teacher initiated the discussions by writing down a system of linear equation in the whiteboard, which is $\begin{cases} x - 4y = -1 \\ 2x + 8y = -2 \end{cases}$. The teacher probed students to find the solution. Students were asked to directly solve the problem in the whiteboard, while the rest of the students still solved the problem in their own table. After a student wrote down his solution in the whiteboard, the teacher didn't directly tell whether the answer was correct or incorrect, but she questioned her students, "Any other solutions?" It indicated that the teacher gave opportunities to students to answer and give their arguments. This kind of activities appropriates with the principles of SCL, in which teachers do not directly tell the answer to the students.

In the end of the lesson, together with the teacher, students concluded the topic discussed. Then, the teacher gave some homework for students. The teacher also asked students to prepare the next lesson about how to solve a linear inequations. Through a good preparation before studying, students would be more ready to receive new lessons. They would also have prepared some questions if they found some difficulties. Those students' questions could be discussed in the classroom with the other students and the teacher. Besides, the individual work at home is also one of the principles of SCL learning approach.

Based on the observation, in order to understand the concept and how to solve the system of linear equation, the teachers didn't give enough opportunities for students to build their own knowledge. The teacher helped students to seek the solution of the given problems. Therefore, students' autonomous in solving problems was neglected.

The first teacher started the second lesson by recalling the previous lesson, which is about the system of linear equations with two variables. Then, the teacher noted that the second lesson was about how to solve an inequation with one variable involving algebraic fractions. The basic competences achieved in the second lesson was explained by the teacher through a slide in a powerpoint which was visualized by using a projector. Each expert group had a problem to solve. During the learning processes, the teacher monitored the flow of the discussion in each group and guided the groups which were unable to master the topic. Based on observation, the teacher directly gave a help to the students. Each of group representations in each expert groups headed back to their former group and explained the result of the discussion to the rest of the group members. There were some students which didn't do the problem given, but they seemed out of the teacher's attention. The teacher only focused on some students in the classroom.

Based on the description of the teaching-learning processes done by the first teacher, here are the analyses of the conformity with the components of SCL included in the Table 1. In the teaching implementation, the first teacher already engaged students to be actively develop their knowledge and the skills learned, and also entangled students to be actively managing their knowledge. In the process of developing knowledge by students, there were some guidance from the teacher. In the learning processes, the first teacher only focus on the mastery learning, whereas the development of learning behavior was neglected. There were less guidance or direction from the teacher as respects to the learning behavior. The teacher only gave more attention to students who gave argumentations and neglecting students which were less active in the learning processes.

The media used by the teacher to provide learning sources was only utilized for certain topics. During this study, the teacher only used the media in the second observation. In the media, the learning objectives and some problems for students were included. The role of the teacher in the learning processes as respects to the motivator and evaluator was less. The teacher tended to be only a



facilitator for the students. the evaluation done by the teacher was only in the end of the lesson, less integrated with other activities during the learning processes. The teacher also didn't evaluate the learning processes, shown that teacher didn't make some mark for the students who actively answered problems and gave arguments in the classroom. In each observation, the evaluation done by the teacher was only for students or groups that actively participated. Students or groups which didn't have opportunities to participate weren't evaluated.

In the other occasion, the second teacher discussed also about a system of linear equation with two variables in the first day of observation. The teacher gave problems and asked students to find the solution of the problems using some different strategies. Some students solved the problem by using substitutions, some others used elimination, and the other used the combination of elimination and substitution to solve the problem. The way of how to solve the problem by using those ways hadn't been taught by the teacher, but before the lesson was started, the teacher had asked students to master the topic by themselves at home. During the group discussions, the teacher monitored the group and sometimes gave help to groups which found difficulties and couldn't be able to understand the topic discussed.

After the group discussion, the teacher asked one student from each group to wrote down the solution of their own group in the whiteboard, and explained to the other students while the other students gave comments. This kind of study was done for some problems discussed. In the end of the activity, the teacher gave problems in the students' textbook to be solved at home as homework.

The implementation of the teaching method by the second teacher in the first observation day gave less opportunity to the students to build their own knowledge. For instance in the group discussions, the teacher gave a lot of help for the groups to solve the problem. Besides, students didn't give the students opportunities to freely choose the methods used to solve the system of linear equations. The teacher had already asked students to solve the problem by used the three methods mentioned before. This indicated that the SCL hadn't been fully implemented.

Based on the description of the teaching-learning implementation by the second teacher, here are the analyses of the conformity with the components of SCL included in the Table 1. In the process of teaching, the teacher didn't accommodate and engage students to build their own knowledge. The teacher tended to deliver the lesson to the students, and the students were only involved during the group work. The basic concepts of the topic were given by the teacher by writing them down in the whiteboard. During the discussion of the problems, the teacher gave a lot of help for students to answer the problem in groups. It means that the teacher gave less attention to the students to build their own knowledge.

During the teaching-learning processes, the second teacher only focused on the mastery of the lesson by the students. The development of the learning behavior was less watched. The teacher gave less direction or motivation as respects to the learning behavior. In the second lesson, the teacher use a media, which is a cartoon, but this media wasn't used by the students to wrote the result of the discussions. During the observations, the teacher didn't use ICT multimedia. The role of the teacher in the teaching learning processes was only as a facilitator. Her role as a motivator and evaluator didn't appear during the observation.

Evaluation done by the teacher was only in the end of the lesson, less integrated with the other activities. Besides, the teacher didn't give feedbacks toward students' work. During the evaluation of the learning processes, the teacher didn't record the students' score. In each meeting, there were only some students who participated in the classroom discussion. Therefore the evaluation was only done



for the active students. Students or groups which didn't participate in the discussion weren't evaluated. The learning environment implemented by the teacher was only cooperative, not the collaborative and supportive. The teaching methods implemented were only the cooperative learning, or in other words, the teacher didn't use many teaching methods.

The Implementation Of Teaching-Learning By The Pre-Teachers

There were three pre-teachers, which were university students of mathematics education, participated in this study. They did some teaching practices using some different methods. The three methods used by the pre-teachers in the classroom were discovery learning, contextual instruction, and self-directed learning.

The following is the analysis of conformity of the implementation of teaching-learning by the pre-teachers with the components of SCL included in the Table 1. The teaching-learning processes done by the pre-teachers didn't engage the students to build their own knowledge. The participation of the students was only in the group discussion when they solved problems mentioned in the students' worksheets. The students' worksheets contained some problems. After students in groups had finished solving the problems, one student in each group represented the result of the group in the classroom and the rest of the students gave responds.

The problems given in the worksheet were only some routine problems, which didn't support students to construct their concept understanding. In the teaching processes, the role of the pre-teacher was as the facilitator. The evaluation done by the pre-teachers was only in the end of the lesson, by giving a test. During the teaching-learning processes, the pre-teacher didn't evaluate students. It indicates that the learning processes didn't really implemented the SCL, because in SCL, the evaluation should be done during the processes of the teaching learning.

CONCLUSIONS AND SUGGESTIONS

The conclusions of this study are: the methods used by the teachers in order to implement the student-centered learning approaches were not multiply diverse. Almost in each lessons the teacher only implemented cooperative learning. In the implementation of teaching-learning by the teachers or by the pre-teachers didn't really implement the SCL. Students didn't construct their own knowledge. Students were only participated in the group discussions to solve problems. Teachers and pre-teachers were only as facilitators. They do not motivate students, especially motivation to build learning behaviors. Evaluations were only done in the end of the lesson, whereas SCL requires evaluations which are also done during the learning processes.

From the conclusions above, we suggest other researchers to do research relating to the implementation of SCL, especially to really support students constructing their own knowledge, whereas the teacher roles are only as the facilitator, motivator, and evaluator.

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