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THE ENHANCEMENT OF STUDENTS LEARNING PROCESS OF CHEMICAL BOND THROUGH DISCOVERY-BASED COOPERATIVE LEARNING

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Abstract

Learning activity is an objective of learning process as wellas the indicator of success for students' future understanding. Learning activity can be observed during the learning process. This research intends to enhance students' learning activity through discovery-based cooperative learning. This action research was done in 2 cycles, with 2 meetings in each cycle. The subject of the research is the learning activity of students in X MIPA-7 SMA Negeri 1 Pekalongan, 1st semester, academic year 2016-2017. The result of the research showed that students learimproved 19% starting from 73% (good) in cycle 1 to 92% (very good) in cycle 2 with very good success indicator. The improvement shows that discovery-based cooperative learning can improve students' learning activity. Other result also showed that there is an improvement of behavior in very good category.

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INTRODUCTION

Learning is a process of interaction between students and teachers in a learning environment (Depdiknas, 2003). A learning process should be oriented to students. Learning activity is a set of activities happened during the process. The activities are directed to the processes of asking question, sharing opinion, doing exercises, answering questions, and cooperating with other students (Zulfikri, 2008; Nanang Hanafiah, 2010).

Learning activity means all activities which physically and non-physically be done (Mulyono, 2001). It becomes an indicator that students want to learn (Rosalia, 2005) that it will raise the situation of active learning (Natawijaya, 2005). It is expected that the changes of students' behavior will happen quickly, correctly, easily, and properly focusing on students' knowledge, science, skills, and behavior (Hanafiyah, 2010). This learning activity is characterized as the relation of physical and mental. If students think without act, it means they do not think (Sardiman, 2011).

From these experts' opinion, students make intensive interaction between teachers and students or among students during learning activity. It will make the situation fresher and conducive where the students can involve their activity maximally. Student-centered learning activity will make knowledge and skills will be directed to their learning outcome.

However, the fact is, the students of X MIPA-7 SMA Negeri 1 Pekalongan, 1st semester, academic year 2016-2017 still have low learning activity. This low activity is due to the domination of 4-5 students. From the initial observation, only these students who do asking question, sharing opinion, doing exercises, answering questions, and cooperating with other students more than other students. It raises the concerns of the teachers during the learning process. Therefore, there should be a real action to solve it.

Actually, the material of chemical bond can make students learning activity enhanced. The mechanism of the formation of ion and covalent bonding can make the students become active. It begins with ionization of metal and non-metal ion to form an ion bond. Likewise, in the formation of covalent bond, it starts from the determination of valence electrons to write Lewis formulation of molecules.

To solve students' low activity from X MIPA-7 class during the learning of chemical bond, it needs a model which is in line with the material. A learning model which is relevant to the learning of chemical bond is discovery-based cooperative learning. This learning model divides students into small groups and give them some tasks (Posamentier in Soedjadi, 1999). In addition, students were given the glimpse of material which is going to be learned with the hope that students will find or complete the materials independently (Dalyono, 1996; Dahar, 2011; Kemdikbud, 2013). These learning can systematically develop the interaction of students to train them before facing the real life of the society (Abdurrahman and Bintoro, 2000). Therefore, stduents will be easier to find and understand difficult concepts, that they will understand how to discuss each other (Slavin in Krismanto, 2003). Students can understand concept, meaning, and relation through the process and finally, make conclusion (Budiningsih, 2005).

Then, discovery-based cooperative learning can make students cooperate in small groups divided based on the different level of achievement, gender, and ethnic background to do the learning process (Slavin, 2005). The objective of the model is to give students place to upgrade their knowledge, concept, ability, and understanding that they need to become an enjoyed person which can contribute to the society (Slavin, 2005). Besides, this model includes pro-academic norms between students which will influence their achievement (Wisenbaken in Slavin, 2005). Therefore, students can motivate their friends, conduct group discussion, and be responsible (Nur, 2005). Since, this model is not merely learning in group (Lie, 2007).

From these explanation, discovery-based cooperative learning make students as a learner able to crystallize in their memory to conclude the learning process which is given a slight in advance. Nevertheless, teachers lead the students to find it. This discovery will be success if the students given a chance to do it. The chance of the students to contribute in the learning process happen if there is a small group consisting of 5-6 students in the classroom.

From the empirical and theoretical background above, the main problem raised in

this research is how to improve the learning activity of students in X MIPA-7 SMA Negeri 1 Pekalongan 1st semester, academic year 2016-2017 using discovery-based cooperative learning?

To answer the problem, this research explains the enhancement of learning process in X MIPA-7 class SMA Negeri 1 Pekalongan, 1st semester, academic year 2016-2017 using discovery-based cooperative learning. Thus, the hypothesis is the learning model can enhance students' learning activity of chemical bond.

The objective of this research is to describe discovery-based learning model to enhance students' learning activity in X MIPA-7 class of SMA Negeri 1 Pekalongan semester 1 academic year 2016-2017. Then, the advantage of this learning model is able to enhance students' learning to the chapter of chemical bond. Meanwhile, teachers can make the learning process better by improving their performance, and, for the school, it can improve the quality of the graduate in the future.

METHODS

This research was an action research done in two cycles. Each cycle has two meetings. The subject of the research was the learning activity of chemical bond chapter in X MIPA-7 class of SMA Negeri 1 Pekalongan, 1st semester, academic year 2016-2017. The data were obtained from one chemistry teacher, an observing teacher, and 34 students (12 males and 22 females). From 34 students, they were divided into 6 groups consisting of 5-6 students. The instrument of the research was non-test, including the teachers' journal, observation sheet, and students' questionnaire. The success indicator of this research was 86% in the category of very good.

RESULT AND DISCUSSION

Learning Process

The learning process of X MIPA-7 class using discovery-based cooperative learning can improve students' learning activity of chemical bond from cycle 1 to cycle 2. According to teachers' observation in the learning process, the students were involved in the activities of observation, arguing, discussion, writing, predicting, modelling, and supporting the learning process. The learning process was supported with the division of 6 group consisting of 5-6 students, making the learning process more cooperative. In this case, teacher gave the learning materials in a glimpse, making the students do the learning process in their own way. It proves that the learning model enhance their learning activities.

The improvement of the activity happened to the activities of 1) Visual activities, like reading, watching pictures, observing, demonstrating, and observing other students; 2) Oral activities, like proposing arguments, asking questions, providing suggestions, sharing opinion; 3) Listening activities, like listening to teacher or providing materials and listening to discussion; 4) Motor activities, like doing experiment, choosing tools, and making model (Zulfikri, 2008); 5) Drawing activities, like drawing chemical bond; 6) Writing activities, like writing formula of chemistry; 7) Mental activities, like solving problems, analyzing factors, and seeing the connection of chemical bond; and 8) Emotional activities, like interest, difference, bravery, calmness, bored, and nerves.

The activity of learning activity

The learning activity of each group to the material of chemical bond to the class of MIPA-7 from cycle 1 to cycle 2 improved as what has been observed by the teachers. The analysis of students' learcan be seen in Table 1.

Table 1. Students' Group Learning Activity

No	Learning Activity	Students in Each Aspects	
		Cycle 1	Cycle 2
1	*Visual activities*	6	6
2	*Oral activities*	4	5
3	*Listening activities*	6	6
4	*Writing activities*	5	6
5	*Drawing activities*	3	5
6	*Motor activities*	4	6
7	*Mental activities*	2	4
8	*Emotional activities*	5	6
	Mean	**4.4**	**5.5**

Source : Primary data

In the table, students' group activity showed an increase. In cycle 1, the class consisted of 4-5 group, while in cycle 2, the group became 5-6. The improvement of the score was due to the revision and atom model which has been checked before. Thus, the learhappened as what expected where in the

following, students can do physical activity (Mulyono, 2001). This learning activity is the indicator of activity which can be observed to improve students' learning motivation (Rosalia, 2005).

The division of groups which consist 5-6 students can make the learning activity enhanced (Natawijaya, 2005). The learning activity can also improve students learning behavior happen quickly, correctly, easily, and properly focusing on students' knowledge, science, skills, and behavior (Hanafiah, 2010).

The increasing learning activity is also including the 1) Visual activities, like reading, watching pictures, observing, demonstrating, and observing other students; 2) Oral activities, like proposing arguments, asking questions, providing suggestions, sharing opinion; 3) Listening activities, like listening to teacher or providing materials and listening to discussion; 4) Motor activities, like doing experiment, choosing tools, and making model (Zulfikri, 2008).

Besides, the enhanced learalso improved students' group activity like 1) Drawing activities, like drawing chemical bond; 2) Writing activities, like writing formula of chemistry; 3) Mental activities, like solving problems, analyzing factors, and seeing the connection of chemical bond; and 4) Emotional activities, like interest, difference, bravery, calmness, bored, and nerves. (Paul B. Diedrich in Nanang Hanafiah (2010).

The division of students into group can make them able to collaborate with their group. Besides, students can teach to each other to solve problems in learning process (Abdurrahman and Bintoro, 2000; Slavin in Krismanto, 2003).

The division of students in groups was based on different achievement, genders, and background (Slavin, 2005). Hence, it can improve students' learning process. With small group, stuent can help and contribute to each other well. Therefore, the learning process can be done well (Wisenbaken in Slavin, 2005). students can motivate their friends, conduct group discussion, and be responsible (Nur, 2005). Since, this model is not merely learning in group (Lie, 2007).

The division of students into group put forward the togetherness, sharing responsibility, and knowledge to finish the task. In the other hand, there is a discussion to evaluate the group discussion and the sharing of opinion (Lie, 2007; Isjoni, 2009; Agus Suprijono, 2009).

In this learning process, teacher gave students a worksheet to stimulate interaction in group (Isjoni, 2009). Therefore, the students can cooperate together. In this learning, during the discussion, teacher led the learning process, if there is agroup which needs teacher's guidance, teacher can help them to solve the problem (Suprijono, 2009). The division of students into group will make them cooperate and help to each other to achive the objective of learning process (Sunal and Hans in Isjoni, 2009; Stahl in Isjoni, 2009; Sugiyanto, 2010).

Students' learning activity

The learning activity of chemical bond in X MIPA-7 using discovery-based cooperative learning enhanced students' learning activity from cycle 1 to cycle 2. The result of students' questionnaire is delivered in Table 2.

Table 2. Students' learning activity

No	Learning Activities	Total of Students	
		Cycle 1	Cycle 2
1	*Visual activities*	28	34
2	*Oral activities*	24	32
3	*Listening activities*	24	31
4	*Writing activities*	28	32
5	*Drawing activities*	30	31
6	*Motor activities*	28	33
7	*Mental activities*	15	25
8	*Emotional activities*	22	32
	Mean	**24.9**	**31.3**
	Percentage	**73%**	**92%**

Source : Primary data

From the table, the average activity of students in chemical bond increased from cycle 1 to cycle 2. The learning activity involved 25 (73%) students changed to become 31 (92%) students (very good) in cycle 2. Inthis case, the use of discovery-based cooperative learning improve the learning process in 19%.

From the data, it was noted that some students' improved learning activity were motivation, attention, observation, and responses. Likewise, their knowledge, skills, and behavior were improved optimally. These things are due to 2 factors, which are: 1) Internal factor (from the students) like: motivation, attention, observation, and responses; and 2) external factor (out of the individuals) like way to get knowledge, concept, skills, and improvement of behavior (Jessica, 2009).

Students' Behavior

Students were proven able to contribute to the learning process with good manner. The changes of behavior included: 1) the awareness to learn from internal motivation; 2) finding experiences and experience it themselves which can give impact to build integral personality; 3) learning based on interest and ability; 4) developing the behavior of discipline and democratic learning environment in the students; 5) concrete learning process which can improve understanding and critical thinking as well as to avoid verbalism; and 6) to build cooperative behavior amongst students that the school becomes enlivened and work in harmony to the society (Hanafiah, 2010). Besides, some students' behavior were also improved in the aspects of visual, oral, listening, motor, drawing, writing, mental, and emotional.

CONCLUSION

This action research to students of X MIPA-7 class of SMA Negeri 1 Pekalongan, 1st semester, academic year 2016-2017 can enhance students' learning activity through discovery-based learning model. The model was implemented to 34 students. The treatment was able to 1) enhance students' learning activity; 2) improve the learning process in 19%; and 3) improve the learning process from cycle 1 to cycle 2 in very good category.

The chemical bond material can be taught to senior high school's science students using discovery-based cooperative learning. However, it needs the planning of students' working sheet and practical tools to help students.

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