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The Effect of Index Card Match Model on Students Learning Outcomes and Activity in Ecosystem Topic for Grade X SMA N 8 Medan

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Abstract
The aim of this study is to know the effect of index card match learning model on learning outcome and activity of students in ecosystem topic in the 8th Senior High School (SMAN 8) Medan. The research method used in this study was quasi experiment by using two sample groups. The population of this study was all 10th grade students and the sample consist of two classes, namely: class IPA 2 known as control class who was taught by conventional learning model and class IPA 3 known as experiment class who was taught by index card match learning model. They were selected using cluster random sampling technique. The instruments used to obtain the data were observation sheet as non-test instrument and cognitive test in form of multiple choices as test instrument. The results of the study show that was significantly effect of index card match learning model on learning outcome (t_{count} = 2.16 ; P=0.03) and learning activity of the students (t_{count} = 13,67, P = 0.00) in ecosystem topic. Based on the study result, it can be concluded that there is an effect of index card match learning model on learning outcome and activity of students in ecosystem topic in the 8th Senior High School (SMAN 8) Medan. The index card match learning model is significantly more effective in enhancing student's learning outcomes and activity in ecosystem topic in the 8th Senior High School (SMAN 8) Medan as compared to the conventional learning model.
Keywords: Index Card Match Model, student learning outcome, student learning activity

1. Introduction

The advances in various sector such as technology or information in global nowadays is very correlated with education achievement. Education cannot be separated from learning. Slameto (2013) said that Learning is a process done by an individual who achieves the new behavior through the learning process. Learning can be improved by a number of factors, such us: curriculum, talent, interest, teaching model, teaching method, facility and infrastructure, teaching approach etc. Among these factors, teaching model is one of the factors that can improve learning outcomes and learning activity.

The lack of students' interest in learning process causes the decrease in students' outcome. It can be seen in the result of national examination in 2013. In North Sumatera, a total of 4564 senior high school students/equivalent did not pass the examination. The chief of national examination committee in North Sumatera, Hendri, said that the level of total number of the students that pass the national exam this year (2013) had decrease by 0,08% from 2012 (previous year). So, it meant that the total students who did not pass the national exam in North Sumatera increased. (Widianto, 2013).

There are factors that causes the low learning outcomes, some of them are: (1) Model and method used by teacher are not varied (Arahim, 2006); (2) Teaching and Learning Process is still dominated by conventional methods (Ghazi, 2003); (3) Learning process dominated by teacher (Sulastri, 2009); (4) The less precise method used by teacher in learning process (Oleyede, 2011); (5) Learning process of student in memorizing level, in which students are more inclined to memorize rather than understand the topic materials, which make them easily forget the matter (Yusuf, 2006).

Based on the researcher's interview with the Biology teacher in SMAN 8 Medan in February 2014, the learning outcomes of students in the school were relatively low during the exam period. It can be seen in the average of Biology's final examination results in the first semester 2013/2014. Students who did not reach the average accounted more than 50% of 30 pupils in the class from minimum score (KKM) 75. In the daily learning process, the students' frequency in asking about topic taught is low, teacher must ask student repeatedly in order to make them want to ask question. Teacher admitted that the poor score of final examination happened because the students do not want to review the topic after class, and also because Biology lesson has a wide scope in term of learning material.

Regardless of what the teacher said, according to Slameto (2013) the low final examination grade is also because the high school teachers are too used to using the lecturing method, it makes students feel bored and less active, even many students tend to learn independently. Progressive teachers dare to use new methods, which help to improve learning and teaching activities, and improve student motivation to learn. The lack of interaction between students and the teacher, and also between students themselves in learning Biology is because the

teacher does not involve student actively and cooperatively in learning. It directly will cause student's skills and attitudes to be less optimally developed. Adles (1982) said all genuine learning is active, not passive. It is a process of discovery in which the student is the main agent, not the teacher.

Application of active learning model on students will help them improve their memory. Active learning model that student centered can improve student thinking and attitude and also can improve his learning outcome (Armbruster, 2009). Therefore the students can achieve successful learning objectives. Learning in which arouse student to be active can improve student learning outcome, because active learning provide the student to think critically (Freeman, 2007). Index card match is the model, which asks students to match a pair of card; this model is very fun to memorize and review the lesson just given before. It is because students can learn while playing (Suprijono in Ni'mah, 2012).

Index card match learning model can develop teamwork and mindset of the students. Students are given one card, it may be a question card or an answer card, and they must match his/her own card with the pair of card given to another student. When the matching card is found, both students in one pair cards must discuss the question and answer in that card, which will make them understand the material learned more. This model is very suitable for students because it involves them more actively, and contains elements of a game so the students will not be bored in learning biology. Students care what they learn about and remember what they understand (Ericksen, 1984).

Yusrida (2011) in her research said that the implementation on *Index card match* model in grade X senior high school has a higher significant increase than conventional model, which achieve pretest (45,42 ± 8,80) and posttest (76,42 ± 7,72) in index card match class and in conventional class pretest (46,28 ± 11,13) and posttest (66,42 ± 8,87). While Maulida (2010) in her research using ICM active model in grade XI natural science senior high school, students have achieved completeness criteria of student that more than 85% of students achieved score more than ≥85%. *Index card match* model was implemented by Sitanggang (2012) in grade X senior high school Berastagi 2011/2012 in Ecosystem topic, and students achieved 86,66% in fourth cycle and more than 75% students were able to answer questions correctly on each level of question based on taxonomy bloom.

2. Method

The location of this research is in SMA Negeri 8 Medan jalan Sampali No 23 Medan. Time of this research in range January-June 2014, which include proposal preparation, research instrument preparation, research instrument standardization, teaching process, collecting data, tabulating data and taking conclusion. The Population in this research was all 2 of grade of X Students in SMA Negeri 8 Medan academic year 2013/2014 consist of 280 Students. The sample was consisted of 2 classes that draw using cluster random sampling technique. X IPA 3 taught by index card match model, while X IPA 2 taught by conventional model. The Design research used is pretest and posttest design, both classes had experienced the same topic. Pre-test and post-test were designed to obtain data from the treatments.

The Research procedures include learning activities both of conventional and index card match class are explained as follow: Preparation stage, in Preparation stage researcher consult the idea of research proposal to supervisor in January, the idea then converted into the creation of a research proposal in February and March. The lesson plans and research instrument also arranged and validated during and after the creation of research proposal, which done in April. Then in April until May, Researcher taught the student in SMA Negeri 8 Medan based on research procedure. Researcher chooses sample class from existing population by using cluster random sampling technique. Dividing the sample classes chosen previously into conventional and index card match class. Conventional class contain of 30 student as same as index card match class. Than both of them given same pretest in the beginning of meeting to get the preliminary data in order to determine the samples with similar prior ability. Student taught for 3 weeks, which each week one meeting. In index card match class taught by *index card match* active learning model, and in conventional class taught by conventional learning model. Both of class taught by direct instruction, in the middle of lesson, there held *index card match* model in the X3, while in X2 continued with direct instruction and discussion between teacher and students. The procedure of *Index card match* model as following: First researcher prepare a lot of paper and cut it into cards equal to the total number of students in the class, than divide the papers become two same sections, in the first section, teacher write down one question for every single card about topic learned, in the second section, teacher write down the answer which correspond to the questions created before. Than researcher shake all of papers piece until mixed between questions and answers, give one card to every each student until all of students get a paper. Teacher explain that this activity done fairly, half of the students get the question paper and another half get answer paper, Then researcher ask student to find their pair. If anyone already found they match, ask them to sit together. Teacher tell them not to talk about their topic to another student, After all of students find their match, ask every pair of students to read question they get loudly then they read the answer too, than write it on the whiteboard, Researcher end this process by clarification and conclusion. There were 2 observers present in class to score student activity. Every observer was observed 15 students in each meeting to maintain the efficiency of research,

the indicator observation sheet and score was arranged and prepared before to keep the equally achievement in students learning activity observation. All samples take a posttest in every meeting to measure the learning outcome, so there is one posttest in each meeting. The data processed and analyzed using data analysis technique. After hypotheses test will be taken the conclusion.

3. Findings

3.1 The Difference of Students' Learning Pretest Between Students who were Teached by Index Card Match Model and Conventional Model.

The average score of index card match group is 32.886, where the highest score is 53.3 and the lowest score is 13.3. Standard of deviation on index card match class is 10,49. The conventional group has the 33.106 in score average, where the highest score is 53.3 with frequency 3 and the lowest score is 13.3 with frequency 3. Standard of deviation on conventional class is 12.06. (Figure 1)

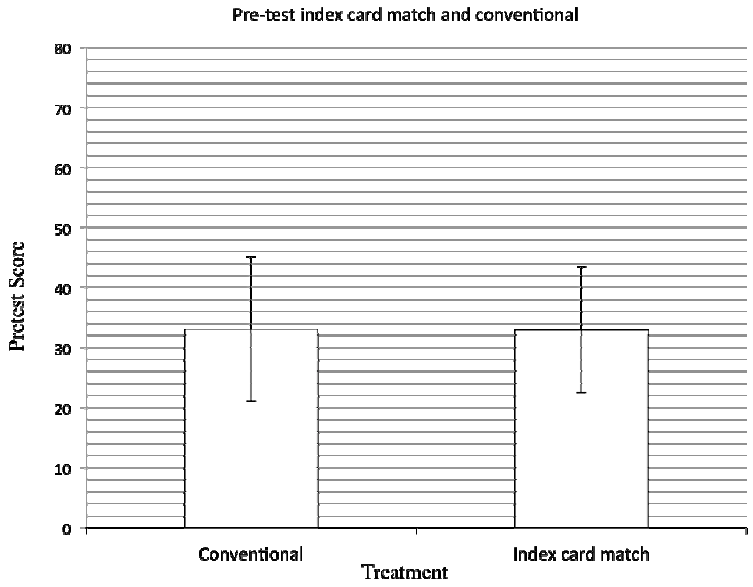

Figure 1. Score of Pretest: Students who were taught using index card match model 32.886 ± 10.49 (X±SD) showed same learning pretest compared to student who were taught with conventional model 33.106±53.3 (X±SD) (t = -0,075 : P = 0,940).

3.2 The Difference of Students' Learning Outcome Between Students who were Teached by Index Card Match Model and Conventional Model.

The learning outcome data as the data of students' learning outcome was obtained after being given the treatment with different learning model. In class conventional model had mean score about 78.32 and deviation standard was 12.20, whereas in class Index card match model had mean score about 83.9 and deviation standard was 8.74. (Figure 2)

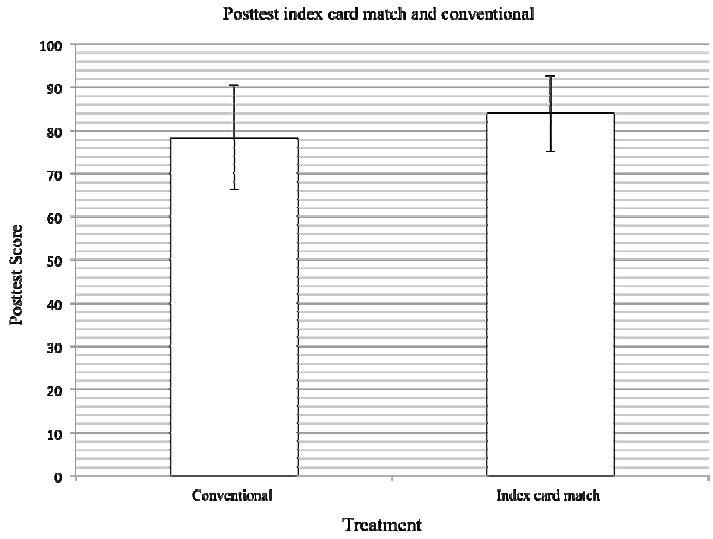

Figure 2. The effect of index card match on student learning outcome. Student who were taught using index card match model 83.9 ± 8.74 (X±SD) showed higher learning outcome compared to student who were taught with conventional model 78.32 ± 12.2 (X±SD), Asterisk indicates that index card match significantly increase students learning outcome. (t = 2.161 ; P=0.036)

3.3 The Difference of Students' Learning Activity Between Students who were teached by index card match model and conventional model.

The average of students' activities in Conventional model class was 56% and students' activities in Index card match Class was 77% (Figure 3). It means that student' activities in Index card match higher than in conventional class and it was obtained for each indicator (Table 1).

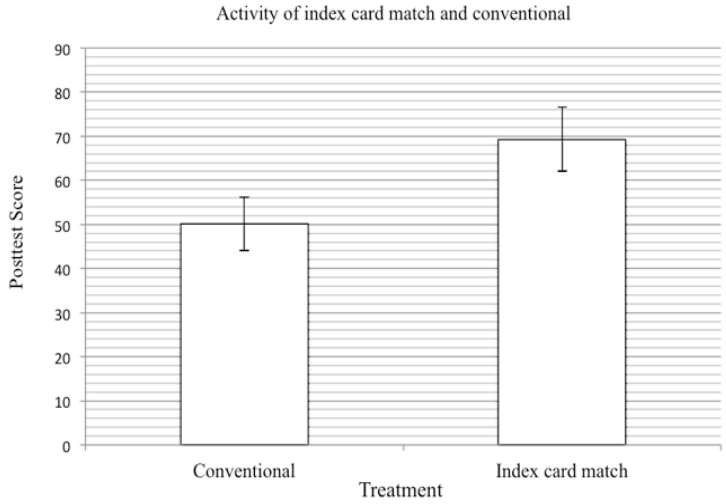

Figure 3. The effect of learning model index card match with conventional model and period of teaching to students' posttest in ecosystem topic, in significance F= 5.672, P= 0.004<0.05 show there significant differences learning activity across learning period taught with index card match model and conventional model. (Figure 3)

Table 1. Observation result of students' activities in every indicator

No	Indicator	Conventional Class	Index Card Match Class
1	Asking	54%	74%
2	Answer Question	53%	71%
3	Giving Question	56%	78%
4	Doing Assignment	58%	76%
5	Perform in front of class	53%	75%
6.	Work Team	57%	77%
7	Paying attention to the teacher	57%	77%
8	Paying attention to learning aids	56%	80%
9	Writing and making notes	57%	81%
10	Learning seriousity	57%	80%
Average		56%	77%
Category		Fair	Active

4. Discussion

After the research classes were given the treatment by different learning model, the posttest result obtained. Index card match class that taught with Index card match model had mean score about 83.9, whereas conventional class that taught with conventional model had mean score about 78.32. Both research classes have normal distribution. The analysis result showed the students learning outcome in index card match class experienced a significant improvement compared with students learning outcome in conventional class. It can be seen from the hypothesis testing by using t-test that shows the value of t_{count} (2.411713) > t_{table} (1.672). Students' learning outcome using index card match model has higher mean score than students' learning outcome using conventional model. It means that there is an effect of *index card match* active learning model on student learning outcome in ecosystem.

Index card match learning model can develop teamwork and mindset of the students. The result showed that index card match class higher learning result than conventional class shows that the use of index card match model in ecosystem topic for grade X are suitable than conventional model. It may occur because index card match model is active learning model so it involves students more actively and they will not be bored in learning ecosystem. Students care what they learn about and remember what they understand (Ericksen, 1984). Schinske in Sari (2012) also say that the use of Index card match model to improve student bravery in cooperative learning, providing data for classroom development, help verify some student who got misconception, and help student to understand the lesson. By understanding the lesson with active learning, student will remember the topic longer than hear the lesson without curiosity. So the learning outcome will improve by using index card match active learning model in class. (Handayani, 2009)

This was appropriate with result study that had been done by Mustolikh (2010) in class A, semester II sociology geography Education students Universitas Muhammadiyah Purwokerto, he obtained that the result of learning student taught by index card match model in sociology are 65.23% in cycle I to 74% in cycle II and 82.61% in cycle III. Diah Aprillia (2012) shows the post test mean score of students taught by index card match model in index card match class is 62.94 and standard deviation is 11.33, while in conventional class the mean score is 71.25 and standard deviation is 8.37. The difference testing is t_{count} (6.57) > t_{table} (0.05) means the average of cognitive learning outcome in index card match class is better than conventional class in grade X SMA Negeri 5 Surakarta, Academic Year 2010/2011.

Judging from the learning model used that are index card match model and conventional model, there are significant differences between students' activity in ecosystem topic in term of differences in the use of learning model. In learning using conventional model, students tend to be more passive even while there are some students who sometimes want to ask the teacher. Students are less enthusiastic in the learning process. In learning using Index card match model, students are more active and willing to ask the teacher because it is supported by a enthusiasm learning atmosphere.

Implementation of Index card match model can be improved students' activity by the mean percentage of 77% rather than by implementing conventional model in classroom 56%. It can be seen from the hypothesis testing by using t-test that shows the value of t_{count} (13.675) > t_{table} (1.672). Students' learning activity using index card match model has higher mean score than students' learning activity using conventional model. Students become more active in index card match class than students in conventional class for all indicators used in the observation Asking, answer teacher questions, giving opinion, doing assignment, perform in front of class, work team, paying attention to the teacher, paying attention to the learning aids, writing and making notes, learning seriousity.

The highest percentage of students' activity is for indicator 8 and 9, which are students were paying

attention to learning aid and making note during the learning process. Learning aid in index card match class used more effective than in conventional class. The activity in index card match class also stimulate student to be more active in making note, because they tend to be active, so they will make note during learning model process while in conventional class, student are passive, and they just sit and listen to teacher, sometimes the level of focus on teacher will decrease, and make them boring in learning process, so they didn't make a note about topic taught. The study of Juntak Margana (2010) concludes the effect of Index card match in Accountant teaching. Where there are the improvement of learning activity and learning outcomes of students' in closed journal topic in SMK Swasta Teladan Medan. After 3 cycles, 33,33% of students are very active, 38,89% are active and 27,78% active enough. Based on the observation result, students' activity in index card match class is higher than students' activity in conventional class. It means that Index card match model gave an effect on students' activity in classroom. Whereas in conventional class, the students are less interested because the circumstance of learning process is monotonous and less attractive, only focused to the teacher.

Index card match model implementation in learning process is useful for teacher and students. For teacher, this model facilitates the delivery of learning material. It can improve the interest and activity of students in learning about material, especially in ecosystem topic. However, based on the experience and observation, there are some advantages and disadvantages of Index card match learning model.

Index card match model can stimulate the enthusiastic of students in learning biology. It can attract and engage them so they can active and focus in the learning process. It can be seen by the posttest result which is index card match class had higher score than conventional class, that is 83.9 and 78.32 respectively.

Moreover, Index card match learning model can stimulate students' activity, and intellectual learning, so that they can retain the material longer than students that taught with conventional model.

Otherwise, the disadvantages of Index card match model such as teacher should have good skills in managing class, teacher must calculate the time carefully because it need a lot of time, and this model only one round, so it is a bit monotonous. Teacher also should create a more comfortable learning environment so that students do not get bored and become more active in the learning process.

5. Conclusion

Based on the result of research in SMA Negeri 8, it can be concluded as follows:

1. There is an effect of *index card match* active learning model on student learning activity in X grade academic year 2013/2014. The students' activity in index card match and conventional class is significantly different, where students in index card match class that taught with *index card match* model is more active than students in conventional class that taught with conventional model.
2. There is an effect of *index card match* active learning model on student learning outcome in X grade academic year 2013/2014. Learning outcome of students in index card match class that taught with *index card match* model showed better results than students in conventional class that taught with conventional model.

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