



The Effectiveness of Reciprocal Teaching Model on the Ecosystem Material to Learning Outcomes and Conservation Attitudes of High School Students

Eryca Nur Bela Negarani¹✉, Ari Yuniastuti¹, Retno Sri Iswari²

Department of Biology, FMIPA, Universitas Negeri Semarang, Indonesia

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Abstract

Learning of reciprocal teaching model directing students to better understand the concepts and independent study. The purpose of this research is to analyze the effectiveness of reciprocal teaching model on ecosystem material to learning outcomes and conservation attitudes of high school students. The design of this research was quasi-experimental. The research population was all students of class X Sciences SMA Negeri 5 Magelang. Sampling was done by purposive sampling technique. The sample used is class X Sciences 2 (control class) and class X Sciences 3 (experimental class). Data collection techniques using observation, test, and questionnaires. Based on the results of the t-test obtained the value of t count (4.249) > t table (2.068) which indicates that H_a is accepted. These results are supported by the results of students' classical completeness of experimental class > 85% i.e. of 91.67% and the N-gain value of experimental class all students get value in the medium category compared to the control class there is one student in the low category. Psychomotor learning outcomes of the experimental class have a higher average (79.98%) than the control class (75.34%). The results of conservation attitudes in experimental class > 75% of students get in good and very good categories in all observed conservation attitudes. The results of students' responses showed 87.50% of students give responses in good and very good categories of the reciprocal teaching model. The conclusion of this research is the use of reciprocal teaching model effective on ecosystem material to learning outcomes and conservation attitudes of students at SMA Negeri 5 Magelang.

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✉ Correspondence:
Building D6 Lt.1 Jl Raya Sekaran Gunungpati Semarang
E-mail: erycanbelan@gmail.com

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INTRODUCTION

Education is one of the keys to progress, the better education quality being organized by a nation, it will be followed by increasingly good quality of that nation. As the implementation of the necessary education curriculum and learning model that can improve the quality and character of the students. At present, the current curriculum in Indonesia is the Curriculum 2013. With the enactment of Curriculum 2013, not only students are required to be creative but teachers are also required to be creative and innovative in creating variations of learning models so that attract interest and activities to improve students' learning outcomes.

Based on observations at SMA Negeri 5 Magelang, SMA Negeri 5 Magelang has applied Curriculum 2013 but only in class X while class XI and class XII still use the KTSP curriculum. The learning process of biology in class X Sciences not yet fully the demands of the Curriculum 2013 because it still uses the lecture-discussion method. Based on the results of interviews with biology teacher of class X at SMA Negeri 5 Magelang, ecosystem material is the last material in the even semester which in practice lack time in implementation. Learning on ecosystem material is usually by giving take-home assignment, such as observation in the environment around the home by each student. The assignment is less effective because it is outside the supervision of the teacher. This can be seen when the discussion in class, students cannot relate the observation results with the material.

Look at these conditions, the need for variation in the learning process to create a different learning atmosphere. Variation can be made by replacing the learning model used with other learning models that have the same concept as Curriculum 2013, to train students to become more independent and active so that they do not always depend on the teacher. One of the learning models that ha the same concept with Curriculum 2013 is reciprocal teaching. Reciprocal teaching is learning that some decisions are left to students as observers and give feedback to friends based on instructions given by teacher (Pitsi et al, 2015).

Application of reciprocal teaching by practicing reciprocal skills, such as summarizing, making questions, predicting answers to questions, and clarifying difficult things are expected to improve cognitive, psychomotor, and conservation attitudes of students. Cognitive ability can increase because students must try to understand themselves by reading materials or asking the teacher to clarify the understanding that they got. Then students explain to friends a group, it strengthens students' understanding and become more memorable due to repeat again what has been learned. Presentation to explain to classmates. According to Ambarsari (2016), presentation activities can improve students' communication skills. In accordance with KD 4.10 psychomotor skills can also be enhanced through simulation activities. According to Magdalena (2014) simulation activities can improve social skills, especially social skills in groups. The use of simulation methods to make students more easily understand the material because students are directly involved in the learning process as if experiencing it themselves (Nurhasanah et al, 2016).

Students' conservation attitudes can be improved are responsibility through the division of tasks in small groups, honest attitude when working on tests, reports, and other tasks both independent and group tasks, environmental care attitude when doing learning both inside and outside the classroom, and tolerant attitude towards others when group discussion. These attitudes adopted from eleven values of conservation character that applied by Semarang State University. The application of conservation character values to students is part of conservation education that aims to change students' behaviors and attitudes to improve knowledge, skills, and awareness of the environment (Hardati et al, 2015).

Based on the description above, then do research about the effectiveness of reciprocal teaching model on ecosystem material. Reciprocal teaching model is expected to be effective on students' learning outcomes in the cognitive and psychomotor domains and students' conservation attitudes.

RESEARCH METHOD

This research is a Quasi-Experimental Design research with Nonequivalent control group design. The research was conducted at SMA Negeri 5 Magelang in even semester in the academic year of 2018/2019. The population of this research w all students of class X Sciences SMA 5 Negeri Magelang consisting of 4 classes, namely class X Sciences 1, 2, 3, and 4. The sampling technique was purposive sampling. The sample used is 2 classes, namely class X Sciences 2 (control class) and X Sciences 3 (experimental class). The control class and experimental class are given the same treatment, namely pretest, and posttest. The control class uses the discussion-information method while the experimental class uses reciprocal teaching model. Data analysis using a t-test to determine the difference in learning outcomes, N-gain test to determine differences of increase in learning outcomes, and students' classical completeness. Indicators of the effectiveness of reciprocal teaching model, (1) differences and increase of learning outcomes in cognitive domain from experimental class compared with control class, (2) the level of students' completeness classically $\geq 85\%$ of the total number of students who have passed the KKM with a value of at least 70, (3) psychomotor domain of learning outcomes $\geq 75\%$ of students get good and very good categories, and (4) results of conservation attitudes $\geq 75\%$ of students get good and very good categories.

RESULTS AND DISCUSSION

Students' Learning Outcomes

Data on students' learning outcomes in this study consist of learning outcomes in the cognitive and psychomotor domains. Data on the cognitive domain (knowledge) include the results of posttest value, while data on the psychomotor domain (skills) are obtained from observation of discussion presentation and simulation activities.

The results of the t-test analysis of the posttest value showed that the t count was 4.249 with t table of 2.068 then t count > t table so it could be concluded that H_a was accepted, which means that the cognitive learning outcomes of the experimental class differed significantly with the control class. This is evident from the average posttest value of the experimental class of 74.33 and the control class of 65.60. Data on cognitive learning outcomes are also supported by the results of classical completeness values, as shown in Table 1.

Table 1 The results of the students' classical completeness of the cognitive domain

No	Subject	Control class	Experimental class
1	The number of students	25,00	24,00
2	Average	71,76	78,125
3	Highest value	80,50	89,40
4	Lowest value	57,25	67,60
5	The number of students who complete learning	14,00	22,00
6	The number of students who do not complete learning	11,00	02,00
7	Classical completeness (%)	56,00	91,67

Based on Table 1, it can be seen that in the control class of 25 students as many as 14 students who get value ≥ 70 and from 24 students in the experimental class as much as 22 students get value ≥ 70 . The value of the classical completeness of the experimental class of 91.67% which means that the experimental class has reached the specified indicator, whereas in the control class of 56% which means that the control class has not yet reached the specified indicator. According to Trianto (2010), each student is said to be complete learning (individual completeness) if the proportion of correct answers to students $\geq 65\%$ and a class is said to be complete learning (classical completeness) if there are $\geq 85\%$ of students who have completed their study. Based on this and adjusted with research results obtained, then it is true that the experimental class has been complete classically because getting $> 85\%$ of students to have complete learning with the value of each student is at least 70 or it can be said that the individual completeness $> 65\%$. Whereas for the control class cannot be said to be complete because the classical learning outcomes obtained are 56% that means $< 85\%$. Cognitive learning outcomes are also supported by differences in students' learning outcomes that are seen from the N-gain value of each student. The data o students' N-gain value as shown in Table 2.

Table 2 The results of the N-gain value of the control class and experimental class

Description	Control class	Experimental class
Average	0,40	0,56
Highest value	0,50	0,67
Lowest value	0,29	0,40

In the experimental class, all students get in the medium category, while in the control class there was one student with a value of 0.29 which was in the low category and 24 other students in the medium category. Based on these results it can be seen that the N-gain value of the experimental class is better than the control class.

The difference in learning outcomes between the experimental class and the control class is due to different treatments. Learning in the experimental class uses reciprocal teaching model while learning in the control class uses information-discussion method. Based on the description of the results obtained shows that the reciprocal teaching model used in the experimental class is more effective on students' cognitive than in the control class that using the information-discussion method. This is supported by the results of students' questionnaires which showed 83.33% of students interested in participating in learning activities using reciprocal teaching model. Almost all students argue in the agree and strongly agree that learning becomes more interesting and not monotonous so students feel more excited and easy to understand ecosystem material after following the learning process.

Learning by using the reciprocal teaching model is more effective due to the repetition activities of material when students explain back to a group of friends. This can increase students' understanding and memory of the material. In addition, the reciprocal teaching model provides opportunities for students to practice independent and active learning without relying on the teacher. It is proven that as much as 91.67% of students feel able to learn independently because they have to try to find information to understand themselves and their group friends. Students find and investigate their own concepts that are being discussed, such as when students make observations in the school environment, so students will be easier to remember a concept. Students' understanding of a concept is an understanding that is truly understood by students. Not only reading and listening but also provides opportunities for students to practice discussing, participating, collaborating, and solving certain problems related to learning material

(Puspita et al, 2017). This can be seen, for example when students discuss answering LDS about ecosystem damage. Students' independence in learning shows that students have been able to play a role as learning subjects that show that learning is student-centered.

Students' learning outcomes both cognitive, affective, and psychomotor are related to each other as expressed by Sudjana (2014) that a person who changes his level of cognition is actually at a certain level has changed his attitude and behavior. Changes in students' behavior can be seen from the results of learning outcomes in the psychomotor domain. Learning outcomes in the psychomotor domain taken from the assessment of the simulation and presentation discussion activities are presented in Table 3.

Table 3 The results of the psychomotor values of the control class and experimental class

Description	Control class (%)	Experimental class (%)
Average	75,34	79,98
Highest value	83,34	88,89
Lowest value	61,12	66,67

The average value of the learning outcomes in the psychomotor domain of experimental class was 79.98, while the average value of the control class was 75.34. Judging from that results, the experimental class have higher results than the control class. It means that students in the experimental class have better communication skills during presentation discussion activities than students in the control class. Not only that, but the simulation activities also train students' social skills in groups. Students' responses regarding the simulation activities carried out on biogeochemical submitters showed that all students chose the agree and strongly agree on the category. It shows that students feel happy when doing simulation activities because simulation activities make the class look more alive and can stimulate students' enthusiasm during the learning process (Bello et al, 2016). The statement proved that students feel challenged to compete with other groups when conducting simulation activities of 91.67%.

The difference in psychomotor learning outcomes is also influenced by cognitive learning outcomes which in the cognitive domain the experimental class has higher results than the control class. These results are in accordance with Sudjana's (2014) statement that psychomotor learning outcomes are actually the advanced stages of new cognitive learning outcomes that appear in the tendencies to behave, so it can be said that the experimental class that uses reciprocal teaching model has better cognitive learning outcomes that are influential positive on student behavior is seen from psychomotor learning outcomes, when compared to the control class that uses information-discussion method.

Based on the results of the analysis of the overall students' response questionnaire statement, the results were 87.50% of students gave good and very good responses. According to Umaeza and Widodo (2017), the response is said to be positive if $\geq 50\%$ of all questionnaire statement items are categorized as very strong and strong. In accordance with that statement, it can be said that students gave a positive response to the reciprocal teaching model because of the results of the questionnaire analysis $> 50\%$.

The learning process and learning outcomes are influenced by several factors including internal factors. According to Slameto (2015), internal factors are one of the important factors in achieving optimal learning outcomes. Internal factors include physiological and psychological factors. Physiological factors such as the body in a healthy state, not in a very tired state, not in a state of physical disability and so on. Whereas for psychological factors in each individual it is different which will lead to learning outcomes that are different.

Psychological factors include intelligence (IQ), attention, interests, talents, motivation, cognitive, and students' reasoning (Rusman, 2012).

Some students in the experimental class have not reached ≥ 70 , this is because each student has a different learning style. In general, students' learning styles are divided into three major groups, namely visual learning styles, auditory learning styles, and kinesthetic learning styles. Visual learning style is a learning style by seeing, observing, and the like. While auditory learning style is learning style by listening, and kinesthetic learning style is learning style by moving, working, and touching (DePorter and Mike, 2007). Reciprocal teaching model is a learning model that facilitates students with auditory learning styles, but in the learning process, there are activities to observe the environment around in the school and simulation. What activities have the aim to facilitate students who have visual and kinesthetic learning styles, but in the results there are still two students whose learning outcomes have not been completed, it is possible that the student has not been able to process the information obtained during the learning process or when receiving explanations from friends who are playing being a teacher is not serious enough so that he is less attentive and understanding. This shows that the learning process still has weaknesses, therefore the teacher needs to review the material that has been studied so that students can strengthen their understanding.

Students' Conservation Attitude

Reciprocal teaching models require students to have a sense of responsibility to complete individual tasks such as when practicing reciprocal skills and group assignments in working on LDS and LKS. This is supported by the results of students' response questionnaires which show that almost all students agree in the agree and strongly agree category regarding the attitude of responsibility complete the task and try to explain to a group of friends. Not only training students to be responsible but in learning by using reciprocal teaching model students are also required to have a good tolerant attitude because during learning more often for groups. When working in groups, a tolerant attitude is needed, because there must be interaction and discussion in the group so that they must have a tolerant attitude to respect the opinions of other group members. In addition, an honest attitude is very important when doing assignments both individual and group assignments. This is in line with the learning in the experimental class that observes the environment around in the school. The activity trains students to be honest in writing observation results and caring about the environment while making an observation.

These attitudes adopted from the eleven conservation character values proclaimed by Universitas Negeri Semarang which were then adjusted to the learning to be carried out. Universitas Negeri Semarang has seven conservation pillars including biodiversity conservation, ethical conservation, art and culture, and conservation regeneration (Hardati et al, 2015). Conservation cadre can be carried out by anyone, such as a teacher. One method that can be done by the teacher as a conservation cadre is to create learning that can foster and practice conservation attitudes within students.

The results of the students' conservation attitudes were obtained from observation sheets of conservation attitudes carried out by observers. Data on the results of conservation attitudes are presented in Table 4.

Table 4 The results of students' conservation attitudes of a control class and experimental class

Description	Control class (%)	Experimental class (%)
Honest attitude		
Average	74,63	78,80
Highest value	93,75	95,63
Lowest value	56,25	56,25
Tolerant attitude		
Average	78,08	81,78
Highest value	95,83	93,75
Lowest value	50,00	62,50
Responsibility		
Average	75,49	77,43
Highest value	91,67	91,67
Lowest value	37,50	54,17
Environmental care attitude		
Average	70,00	77,83
Highest value	76,00	85,42
Lowest value	64,00	70,84

Based on the results presented in Table 4, it can be seen that the results of the conservation attitudes for each sample class vary in each aspect of assessment. On the average value of honesty for the control class is 74.63 and the experimental class is 78.80, while the value of tolerant attitude in the control class has an average of 78.08 and the experimental class is 81.78 and the value of responsibility for the average control class is 75.49 and the experimental class is 77.43. The difference in results is because each student has a different character so that for the attitude assessment each student must be different, but the difference in value between the control class and the experimental class is not far apart. The value of environmental care attitudes in the control class gained an average of 70.00, while the experimental class was 77.83. These results indicate that the average of all attitudes in the experimental class is higher than the control class which means that the conservation attitude in the experimental class is better than the control class.

In the experimental class, for honest attitude there was 1 student in the sufficient category, 12 students in the good category, and 11 students in the very good category, so students who got good and very good categories were 95.83%. Tolerant attitudes of all students are in good category (11 students) and very good category (13 students), so students who get good and very good categories are 100%. Responsibility, there are 2 students who get sufficient category, 12 students in the good category, and 10 students in the very good category, so students who get good and very good categories are 91.67%. Environmental care attitude in the (Yes) category which shows that students behave according to the indicators or aspects observed there 77.83%. From that four attitudes have reached the specified criteria, $\geq 75\%$ of students scored in the good and very good categories which means that students in the experimental class have good conservation attitudes.

In the control class, for honest attitude, there were 3 students who got sufficient category, 13 students in the good category, and 9 students in the very good category, so students who got good and very good categories were 88%. Tolerance attitudes there are 3 students who get sufficient category, 9 students in the good category, and 13 students in the very good category, so students who get good and very good categories are 88%. Responsibility there are 4 students who get sufficient category, 10 students get a good category, and 11 students who get a very good category, so students who get good and very good categories are 84%. From that three attitudes have reached specified criteria, $\geq 75\%$ of students get in good and very good categories, but when compared with the experimental class, the results obtained are higher in the

experimental class so that it can be said that students in the experimental class have good honest attitude, tolerant attitude, and responsibility than students in the control class. Environmental care attitude obtained by the average number of answers (Yes) which indicates that students behave according to the observed aspects of 70%. These results can be said that students in the control class lack good environmental care attitude because < 75% or do not reach the specified criteria.

Based on these results, there are differences between the control class and the experimental class in each attitude observed. This can still be said to be fair because attitude judgments are influenced by the different character of each student. According to Rosa (2015), there is a link between the affective domain and the cognitive domain where if a student has good cognitive abilities then the student has affective abilities or a good attitude. But the attitude and success of learning a student are influenced also by environmental conditions, so it does not rule out the possibility if a student who has the characteristics of a good attitude but cognitive enough and vice versa.

CONCLUSION

Based on the results of the analysis and discussion has been done, it can be concluded that the reciprocal teaching model is effective on learning outcomes and conservation attitudes of students at SMA Negeri 5 Magelang on ecosystem material. Cognitive domain of learning outcomes indicated by the results of t-test that the average value of posttest from experimental class differs significantly with control class, this is supported by the results of students' classical completeness in experimental class as well as the average value of N-gain from experimental class is higher than control class. The psychomotor domain of learning outcomes is shown by the average results of the experimental class is higher than control class, and students' conservation attitude by looking at the average results of the four attitudes observed in experimental class show better results than control class.

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