



The Implementation of Discovery Role Play for Nervous System Learning in Senior High School

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Article Info

Article History:

Received: 2018

Accepted: 2018

Published: August 2020

Keywords:

Discovery role play; learning outcome; communicative character.

Abstract

This study aimed to implement the discovery of roleplay on nervous system material in senior high school. This is Quasi-Experimental research conducted in January - October 2018 in the Biology Department FMIPA Universitas Negeri Semarang and MA Matholi'ul Falah Demak. The sampling technique is purposive sampling. The data collected were learning outcomes, communicative characters, student responses, and teacher interviews. The student learning outcomes data in the form of cognitive aspects of the results of the data are analyzed by t-test and communicative character data are analyzed using descriptive percentages. The results show that the average score of cognitive learning outcomes is 83.32 and 75.32, the result of the t-test is 0.001, indicating that there is a significant difference between the experimental class and the control class. The result of the communicative character of students is 92% with excellent criteria. The conclusion of this study is the implementation of discovery role play affects the learning outcomes and the formation of the communicative character of students in nervous system material in senior high school.

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p-ISSN 2252-6579
e-ISSN 2540-833X

INTRODUCTION

One of the learning principles used in the 2013 curriculum is to create active learning, competency-based, and provide a pleasant learning atmosphere. One of the learning models in the 2013 curriculum is discovery learning, which is a learning model that invites students to discover the main concepts of matter independently. Discovery learning model is by the 2013 curriculum is needed to support character education and other competencies, namely knowledge and skills (Supliyadi *et al.*, 2017). Another learning model that is roleplay is a learning model that can be applied in applying the value of national character for students in learning because this model can explore students' feelings, attitudes, and skills (Abdullah, 2017). According to Agustina *et al.* (2015) in her research, it was stated that teachers must be able to create an effective communication environment. Supported by Anggraeni *et al.* (2015), the roleplay model can also improve student learning outcomes in the material being studied, followed by an increase in student character values (Bhattacharjee & Ghosh 2013). The impression of pleasant learning is also an important factor that helps in developing learning (Rigas & Ayad 2010).

Education is not only developing people in improving the quality of learning, but also able to create people with morals and manners of their nation and country. Character education should be delivered in all subjects taught at school, especially at the level of secondary education and higher. One of the character values formulated by the Ministry of National Education is a communicative character where the communicative aspect is an attitude that shows pleasure in talking, associating, and working with other people (Ministry of National Education 2013). According to Chik (2016) communication skills can increase mutual respect, tolerance and cooperation.

The results of interviews for teachers and students on nervous system material, it is known that they were still difficult to determine the appropriate learning model which is fun, interesting and engage students to be active in learning nervous system. The human nervous system concept requires a learning model that builds students always to be active, think critically, and be able to understand well the concepts or core of the material and provide a pleasant learning atmosphere experience. So that the learning model which is used is expected to illustrate the concepts that exist in the material, such as through modification of the variety of learning models, for example with discovery models and role play.

This study aimed to determine the effect of discovery roleplay on learning outcomes and the formation of the students' communicative character for nervous system material in senior high school.

RESEARCH METHOD

The research was conducted at MA Matholi'ul Falah Demak in the even semester of the academic year 2017/2018. This is a quantitative research. The population of this study was all students of class XI IPA consisting of 44 students divided into two classes. The sample was determined through purposive sampling. The samples used were students of class XI IPA 1 and XI IPA 2. The research data included data on learning outcomes, students' communicative characters, students' responses, and Biology teacher interviews. Student learning outcomes data in the form of cognitive aspects of the results of the data were analyzed by t-test, while the affective and psychomotor aspects were analyzed by descriptive percentage. Communicative character data and student responses were analyzed using descriptive percentages, and data from teacher interviews as reinforcement.

The procedure of this study is (1) the preparation stage (making proposals and research instruments) including preliminary observations and literature studies for theory, questionnaires, and test the question instruments; (2) the implementation phase, including giving pre-test, giving material with the implementation of discovery role play, and giving post-test; (3) data analysis stage, including statistical test analysis (normality, homogeneity, similarity of two variances, and t-test) and percentage descriptive analysis. Summary of statistical tests using calculations based on formulas and SPSS 16

RESULTS AND DISCUSSION

The research activity was done in three stages. The first is was a pre-test activity to find out the initial abilities of students in the experimental and control groups. The next stage was given learning through implementation discovering roleplay in the experimental group and the application of conventional learning

to the control group. The final stage was post-test to measure the learning outcomes of the nervous system material and also to determine the formation of communicative character formation of students.

Analysis of Students Initial Capability Data before Learning

Table 1 Pre-Test Result Description

No.	Component	Pre-test	
		Experimental Class	Control Class
1.	Number of Students	22	22
2.	Mean	55.50	50.36
3.	Highest Score	70	70
4.	Lowest Score	46	40
		KKM 75	
	Completed Score	0%	0%
	Incomplete Score	100%	100%

Table 1 reveals that from 22 experimental group students the average initial ability in the nervous system material before implementing discovery role play reached 55.50 while from 22 control group students the average initial capacity in nervous system material before conventional learning reached 50, 36. The highest initial capacity of the two groups reached 70, and the lowest ability for the experimental group reached 46 while the control group reached 40. It appears that the initial abilities of the two groups are still below the learning requirements of 75. This happened because students have not received nervous system material.

The results of the normality test of the pre-test data from the experimental and control groups, based on SPSS 16 Kolmogorov-Smirnov, are obtained significance values for the experimental class 0.541 and the control class 0.454. The significance value of the two classes is greater than 0.05, so it can be concluded that the data are normally distributed and can be tested using parametric statistics. The homogeneity test results of pre-test data between the experimental and control groups, based on the results of the analysis with SPSS 16 Levene-Statistics, are obtained a significance score of 0.419 is greater than 0.05 so that it can be concluded that the experimental class pre-test and control data are homogenous. The similarity test results are averaged between the experimental and control groups. Tests are carried out on the experimental and control classes pre-test data using SPSS 16 Independent Sample t-test with a significance level of $\alpha = 0.05$. From the test results obtained a significance value of 0.084 in Sig. (2-tailed). The significance value is greater than 0.05 so it can be concluded that the pre-test value of the experimental and control classes has no difference (same). This shows that between the experimental and control groups have the same initial ability to understand nervous system material before learning.

Analysis of Students Learning Outcome Data after Learning

Table 2 Pre-Test Result Description

No.	Component	Post-test	
		Experimental	Control
1.	Number of Students	22	22
2.	Mean	83.32	75.32
3.	Highest Score	96	92
4.	Lowest Score	70	60
		KKM 75	
	Completed Score	86.3%	77.3%
	Incomplete Score	13.6%	22.7%

Table 2 shows that from 22 students of the experimental class' average of learning outcomes in nervous system material after implementing discovery role play reached 83.32 while from 22 control class students after the application of conventional learning reached 75.32. The highest learning outcomes in the experimental class reached 96 and the lowest was 70 while the most upper control class reached 92 and the lowest was 60.

The results of the normality test on post-test data from the experiment and control groups, based on the results of the analysis with SPSS 16 Kolmogorov-Smirnov, obtained significance values for the experimental class 0.654 and the control class 0.280. The significance value of the two classes is higher than 0.05, so it can be concluded that the data are normally distributed and can be tested using parametric statistics. The homogeneity test results of the experimental and control post-test data, based on the results of the analysis with SPSS 16 Levene-Statistics, obtained a significance value of 0.658 greater than 0.05 so that it can be concluded that the post-test data of the experimental class and control class are homogeneous.

The data used in the t-test is the post-test value, then tested using the SPSS 16 Independent Sample t-test program with a confidence level of $\alpha = 0.05$. H_a is accepted if the value is a sig. (2-tailed) smaller than 0.05. Based on the results of testing with SPSS 16 Independent Sample t-test, the sig value (2-tailed) is obtained 0.001 smaller than 0.05. Thus it can be said that the implementation hypothesis of discovery role play affects learning outcomes.

The Post-test Independent Sample t-test showed that there were significant differences in the average learning outcomes between the two classes, where the average value of the experimental class learning outcomes was higher than the control class. The differences in the value of post-test between experimental and control classes due to differences in treatment. The average post-test value in the experimental class is higher than the control class because learning in the experimental class uses the implementation of discovery role play while in the control class only uses conventional learning modes.

Learning in the control class is more understandable by students in the material being studied because students do not need to adapt to the model used by the teacher. However, the learning carried out in the control class is more teacher-centered where learning is done conventionally and only provides very few opportunities for students to be active in learning. In contrast to the experimental class that uses discovery role play, where previously it has not been used by the teacher, so the teacher must play a full role in understanding students both in conducting discussions, performing roleplays, and providing reinforcement. However, the existence of a new learning model also makes students have a higher curiosity, making students attractive to take part in learning, so they are more serious in participating in learning than the usual model used by the teacher. And the roleplay activities can create a pleasant learning atmosphere that makes students motivated to learn and does not look depressed to carry out learning activities. Then it can be said that the learning model influences student learning outcomes, where the use of appropriate and attractive models will provide many learning resources, information, and communication that help students the material (Lisdiana *et al.* 2017).

The Analysis of Affective and Psychomotor Aspects of Learning Outcome

Learning outcomes on affective aspect or attitudes and psychomotor aspect of students during nervous system material learning with the implementation of discovery roleplay in the experimental group and the application of conventional learning models to the control group revealed through observation during learning activities.

Table 3 Students' Learning Outcome on Affective Aspect

No.	Aspects	Experimental Class		Control Class	
		%	Category	%	Category
1	Honest	81	Excellent	78	Good
2	Cooperation	98	Excellent	80	Good
3	Discipline	91	Excellent	78	Good
4	Tolerance	93	Excellent	79	Good
	Rata-rata	90.75	Excellent	78.7	Good

Table 4 Students' Learning Outcome on Psychomotor Aspect

No.	Aspects	Experimental Class		Aspects	Control Class	
		%	Category		%	Category
1	Asking questions to the teacher or other students during the discussion process.	79	Good	Asking questions to the teacher or other students during the discussion process.	68	Good
2	Giving opinions on the process of discussion activities.	76	Good	Giving opinions on the process of discussion activities.	67	Good
3	Create roleplay scripts	96	Excellent	Presenting the results of group discussions	74	Good
4	Playing the roleplay	86	Excellent	Making a brief report on the results of group discussions	78	Good
5	Concluding the results of the discussion	78	Good	Concluding the results of the discussion	75	Good
Total		83	Excellent		66,4	Good

Table 3 shows the learning outcomes of affective aspect or attitude of students, the experimental group with the implementation of discovery role play, in general, is excellent (90.75%). This is because the implementation of discovery role-play is a new learning model for students and this model can encourage students to be more active in learning. While in the control group the application of conventional learning model is generally good (78.7%). This is because the conventional learning model for students is a model that is commonly used by teachers so far, so it cannot give an impression to students. Besides that, the conventional model is through lecture learning, question, and answer, and this assignment is commonly used by teachers so far and according to one interview with conventional model students is less attractive and less able to activate students involved in learning. Table 4 shows that student learning outcomes on the psychomotor aspect or student activities in the experimental group during learning with the implementation of discovery roleplay in the category of excellent (83%) while learning outcomes psychomotor aspects in control group students during learning using conventional models in good categories (66.4%). According to Setyaningrum *et al.* (2015) three aspects of assessment (cognitive, affective, psychomotor) on Biology learning will be achieved if supported by a scientific approach, if a material does not yet describe the scientific approach, then the three aspects of learning outcomes are not maximized to the point that results in student learning is not satisfactory.

The Analysis of Students' Communicative Character

The communicative character questionnaire results of students are obtained from the value of student character education which is devoted to the communicative character of students in school and class. The results of the students' communicative character questionnaire show that 92% of the experimental class students have excellent criteria in forming communicative characters. So it can be concluded that the value of the communicative character questionnaire of the experimental class students with the implementation of discovery role play has excellent criteria.

Implementation of discovery role play in the experimental class supports the formation of communicative characters of students, where students are involved in learning directly, through roleplay activities that indirectly require students to communicate with each other, work together, provide support to friends both in their groups and other groups. So that the atmosphere of learning is still fun and can run smoothly while roleplay is a learning model that can be applied in instilling the value of national character for students in learning, because this model can explore the feelings, attitudes, and skills of students (Abdullah, 2017).

Communicative character formation is not only centered on students but also must be owned by a teacher. The teacher must also have this character so that his students can emulate them. For example, if the teacher wants his students to be able to work together in groups, communicate with each other, share, support each other, then the teacher must also have that character. This is intended to strengthen the communicative character of each student through the example of the teacher.

Students' Response Analysis

Based on the questionnaire filling regarding students' responses after the learning process with the implementation of discovery roleplay in the experimental class, data obtained in the experimental class as many as 94% of students have very good response criteria. With the implementation of discovery roleplay in nervous system learning, students feel more pleasant in participating in learning so that it can arouse student motivation in learning. Learning with the implementation of discovery roleplay became more interesting, does not make students feel bored because learning provides more opportunities for students to be more active and directly involved in the play in the material being studied. Also, these learning activities can also enhance group collaboration, establish communication links between students and teachers, and also foster mutual respect between friends and teachers in expressing opinions.

The Teacher's Interview Analysis

The results of the interview with Biology teacher using unstructured interviews where the researcher does not use interview guidelines that have been arranged wholly and systematically to collect the data. Overall, Biology teacher argues that learning with the implementation of discovery roleplay affects student learning outcomes that are from comparing the results of the pre-test and post-test results. In the opinion of the Biology teacher regarding the influence of the implementation of discovery roleplay on the nervous system material on the formation of communicative character of students, said that the implementation of the model has an influence on the structure of student character, where students are required to work groups that must automatically be able to communicate with the students and teacher, and must be able to communicate to the front of the class, so that the influence of the implementation model of discovery roleplay can form communicative characters well.

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that the implementation of discovery roleplay affects the outcome of learning and communicative character formation in nervous system concept in senior high school.

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