

Implementation Science Monopoly Games Towards Cognitive Abilities and Scientific Attitude of Elementary Students

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ABSTRACT. Learning natural science in grade IV SDN Wujil 01 shows that 76% of students' cognitive abilities are still below the minimum completeness criteria and 18% of students' scientific attitudes are still low. Therefore, it needs to be innovative solutions to improve science learning in the classroom; it is media by combining game elements. One of them is the science monopoly game. This study aims to determine how effective the use of science monopoly games on the cognitive abilities and scientific attitudes of elementary students. In addition, it can be used as a strategy for elementary school teachers and prospective elementary school teachers in preparing a fun science learning process. The type of research used is experimental research with a two-group posttest only design. The data collection techniques used was documentation, tests, and observations. The data analysis involved 1) Test instruments using the Anates V.4 application program covering the validity of the test, the reliability test, the difference between the results and the difficulty level of the questions; 2) Normality test Kolmogorov-Smirnov test in PASW Statistics 18 software. 3) Homogeneity test in this study using the Levene test (test of homogeneity of variances) in PASW Statistics 18 software; 4) the similarity of the control class learning average (83.55 > 71.26). In addition, the scientific attitude that elementary students have during the learning process uses the science monopoly game in the very good category with a percentage of 84.02%. On average, it uses the independent sample t-test with PASW Statistics 18 software. The results showed that learning using science monopoly games was effective in improving the cognitive abilities and scientific attitudes of elementary students. This is indicated by the significance level 0.008 and 0.005 < 0.05, while the average value of learning science in the experimental class using the science monopoly game is higher than the average value of the control class.

Keywords: Science Monopoly Games, Cognitive Abilities, Scientific Attitude, Elementary Students.

1. INTRODUCTION

Natural Sciences (IPA) is the result of human activity in the form of knowledge, ideas and concepts which are organized logically and systematically about the natural surroundings on experience gained through a series of scientific processes such as observation, investigation, preparation of hypotheses followed by testing the idea (Sujana 2009: 92). Based on this definition, knowledge and scientific processes that generate scientific attitude is indispensable in science learning.

The assessment of scientific attitudes is important to be done when natural science learning takes place because it is related to the abilities that are used as references for students who are capable or unable in learning process (Anwar, 2009). This scientific attitude contains three dimensions, they are cognitive beliefs, affective or evaluative feelings, and someone's behavior towards attitude objects. With a scientific attitude, it will develop a positive attitude towards science learning which makes a high contribution to the achievement of student cognitive outcomes.

However, the results of observations of science learning in grade IV SDN Wujil 01 show that students who are busy during learning, do not appreciate learning when the teacher explains, students who actively answer and work on questions

are only 18% of the total students, do not want to try to do the questions, lazy to read and even open learning books. This shows that students lack curiosity and they are not serious about learning science which has an impact on students' cognitive abilities. Therefore, students' scientific attitudes and students' cognitive abilities need to be improved.

Teacher of grade IV provides information that students' scores have not reached the minimum completeness criteria in almost every final evaluation of learning is 76% with an excuse that the teacher's space is limited and students have not been able to find the concept of the material being studied on their own. The teacher has not found a suitable strategy in delivering learning material. One of these strategies is to use learning media to facilitate in delivering science learning material to students.

Learning media has an important role for elementary students because students still think concretely so that students have difficulty understanding material that is abstract. Through this learning media, it will make it easier for students who do not understand certain concepts. In addition, learning is more memorable and effective (Djamarah, 2010 & Naz and Akbar, 2010).

Children at this stage are mature enough to use logical thinking by using physical objects directly. Therefore, it is necessary to improve learning in class. The way that can be done to improve the

learning conditions is by making changes in the learning process by using innovative game media, it is the science monopoly game.

According to Vikagustanti, et al., (2014), this monopoly game can develop interest in learning so that students can easily understand the material being studied. The use of monopoly games as a science learning media at the elementary school level is expected to create innovative, interactive, effective learning in improving students' cognitive abilities, and fun.

Like previous studies, it shows that monopoly game play is effectively used to increase student interest in learning (Bachtiar (2010). Priatama's research (2014) also explains that monopoly game play is a very important role in fostering curiosity in strengthening the learning concepts that students learned.

2. METHOD

This research is an experimental study using the posttest-only control design method. Sampling used random sampling technique, in order to obtain an experimental class which was given treatment with monopoly game media (grade IV SDN Wujil 01) and control class (grade IV SDN Wujil 02) which was given treatment with PowerPoint media.

TABLE 1. Posttest-only control design

Group	Variable	Treatment	Posttest
Experiment	R	X	O ₁
Control	R	Y	O ₂

Technique of collecting data used documentation, tests, and observations. Test the validity of the instrument used the Anates V.4 application. The data analysis technique used PASW Statistics 18 software, it is the normality test using the kolmogorov-smirnov test; homogeneity test used the levene test (test of homogeneity of variances); and the average similarity test used the independent sample t-test.

3. RESULT AND DISCUSSION

Result The natural science monopoly media contains sub-subjects material in each square that match with the natural science material that will be studied by students. There is a summary of material on the relationship between Natural Resources and the Environment, Technology and Society on the Learning Opportunity Card to increase students' insights, and there is also a question bank card in the media to train students' knowledge skills.

The natural science monopoly media contains elements of character values that emerge and grow when the science learning process is ongoing, including discipline in obeying all game rules, fostering student curiosity in learning the material on the media, and generating hard work and being

responsible in completing problems/tasks in the form of challenges that must be answered in monopoly media. The output of this research is the creation of effective communication between students and creating a pleasant atmosphere in learning which will have an impact on increasing cognitive abilities and fostering scientific attitudes after learning using monopoly media.

3.1 Cognitive Abilities of Elementary School Students

The process that occurs in increasing students' cognitive growth is through assimilation and accommodation. Students adjust or match new information with what they already understand after learning to use the science monopoly. After that, students reconstructing and rebuild what they understand so that the new information can be better adjusted. This cognitive ability as a result of complementarities between assimilation and accommodation in the process of reconstructing and changing what is already known.

Dimiyati (2016) mentions six types of cognitive behavior; they are knowledge, understanding, application, analysis, synthesis, and evaluation. In addition to the six types of behavior, there is one behavior that is included in the cognitive domain based on the revised bloom taxonomy, namely designing something. Prabowo & Widodo (2018), state that increasing students' cognitive abilities is very important to decide the right learning strategy to achieve learning goals. The cognitive abilities shown by elementary students when learning using science monopoly are as follows.

3.1.1 The Results of Normality Test

TABLE 2. Normality test results

Class	Kolmogorov-Smirnov ^a		
	Statistic	Df	Sig.
Pretest_control class	.166	30	.065
Posttest_control class	.183	30	.051
Pretest_experiment class	.174	18	.153
Posttest_experiment class	.195	18	.070

Based on Table 2, the results of the pretest data normality test using Kolmogorov-Smirnov obtained the significance level of the experimental class = 0.153 while the control class = 0.65. These results concluded that the initial (pretest) data for the control class and experimental class were normally distributed because the significance value was greater than 0.05.

While the significant results of the posttest data normality test of the experimental class obtained = 0.070 and the significant results of the control class obtained = 0.051. So it can be concluded that the posttest data is normally distributed because the significance level is greater than 0.05. Thus, the pretest and posttest data in both classes were normally distributed.

3.1.2 The Results of Homogeneity Test

TABLE 3. Homogeneity test results

Value	d1	d2	Sig.
Pretest	1	46	.053
Posttest	1	46	.065

Based on the results of calculations in Table 3, the pretest data homogeneity test with Levene's test in the experimental class and control class obtained a significance value = 0.053 > 0.05, it can be concluded that H_0 is accepted, that is, both classes

have the same or homogeneous variance. While the results of the calculation of the homogeneity test of the posttest data in the experimental class and the control class obtained a significance value = 0.065 > 0.05, it can be concluded that the two classes have the same or homogeneous variance.

3.1.3 The Results of t-Test

TABLE 4. The results of independent sample t-test

	T	Df	Significance	Average	The Lowest	The Highest
Control	-2.794	46	.008	71.26	40	94
Experiment	-2.969	42.596	.005	83.55	52	96

Based on Table 4, the average learning value of the experimental class using the science monopoly game is higher than the average learning value of the control class (83.55 > 71.26). This shows that in improving students' cognitive ability is better to study using natural science monopoly games than learning using PowerPoint media. Such as research by Susanto et al (2012); Prastiwi et al (2012); and Azizah (2013) found that learning using monopoly learning media was more effective than conventional learning methods. Because with monopoly learning media students become more active in the learning process, besides learning which was initially only teacher-centered, with using monopoly learning media, it becomes student-centered learning. In monopoly games students are required to master the material in a fun way so that students' interest in learning will grow and it is effectively used in learning.

learning process using the natural science monopoly game are as follows.

TABLE 5. The results of observation of students' scientific attitudes using the natural science monopoly game

Indicator	Curiosity	flexibility	Critical	Honesty	Total
Number of students	18	18	18	18	18
Score	60	61	57	64	242
Maximum score	72	72	72	72	288
Class average score	3,33	3,38	3,17	3,55	3,35
Percentage	83,33%	84,72%	79,16%	88,88%	84.02%
Criteria	Excellent	Excellent	Excellent	Excellent	Excellent

Based on Table 5, it shows that the scientific attitude of elementary students during the learning process using the science monopoly game is in the very good category with a percentage of 84.02%. Natural Science monopoly learning media has several advantages and has attractive characters for students in learning to solve problems so that the characters of curiosity, critical, and honest attitudes of students are in the very good category.

4. CONCLUSION

When studying with the science monopoly, students can play while studying the material on each monopoly square. This aims to overcome boredom in learning and to develop enthusiasm in learning natural science because basically the characteristics of elementary school fourth grade students like games. Through this game students can interact with other students, work together with their peers to solve problems in the game. This matches with the opinion of Schunk (2012: 345) that when students and their peers work together on tasks, social interactions which exist can play a role as a function of the learning process. In addition, games become a vehicle for socialization, including teaching children about the nature of social rules and conventions. Students learn roles, rules, relationships, friend skills, appropriate forms of behavior, and the consequences of students' actions to others, Bruner in Bennet (2005: 18).

3.1.4 Scientific Attitude of Elementary School Students

The results of observations to see the scientific attitudes of students that appear in the science

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