

Improving Science Knowledge Competence Through the Scramble Type Cooperative Learning Model for Sixth-Grade Elementary School Students

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ABSTRAK

Pada saat ini masih banyak siswa merasa bosan dan kurang memahami materi pembelajaran yang dilakukan di dalam kelas terutamanya pada pembelajaran IPA. Hal ini disebabkan karena kegiatan pembelajaran yang dilakukan di dalam kelas masih berpusat kepada guru sehingga membuat siswa merasa cepat bosan dan juga kurang bersemangat saat mengikuti kegiatan. Tujuan dilakukannya penelitian ini adalah untuk mengetahui pengaruh Model Pembelajaran Kooperatif Tipe Scramble Terhadap Kompetensi Pengetahuan IPA Siswa Kelas VI SD. Jenis penelitian ini yaitu kuantitatif dengan desain eksperimen semu (quasi experiment). Populasi dalam penelitian ini yakni 448 siswa kelas VI SD. Penarikan sampel dilakukan menggunakan teknik cluster random sampling, dengan jumlah sampel akhir yakni 28 siswa sebagai kelompok kontrol dan 28 siswa sebagai kelompok eksperimen. Pengumpulan data dalam penelitian dilakukan menggunakan metode tes, dengan instrument penelitian test objektif dalam bentuk pilihan ganda. Teknik yang digunakan dalam menganalisis data yaitu analisis statistik deskriptif dan statistik inferensial. Hasil penelitian menunjukkan bahwa terdapat perbedaan yang signifikan dari kompetensi pengetahuan IPA antara siswa yang diberi perlakuan menggunakan model pembelajaran Kooperatif Tipe Scramble dengan siswa yang tidak diberikan perlakuan berupa model pembelajaran Kooperatif Tipe Scramble. Sehingga berdasarkan hasil tersebut dapat disimpulkan bahwa model pembelajaran Kooperatif Tipe Scramble berdampak positif yang signifikan dalam meningkatkan kompetensi pengetahuan IPA pada siswa sekolah dasar.

ABSTRACT

At this time, many students still feel bored and need help understanding the learning material carried out in class, especially in learning science. It is because the learning activities carried out in the classroom are still centered on the teacher, so students feel bored quickly and are less enthusiastic when participating in activities. This study aimed to determine the effect of the Scramble Type Cooperative Learning Model on the Science Knowledge Competence of Sixth Grade Elementary School Students. This type of research is quantitative with a quasi-experimental design. The population in this study was 448 students of sixth-grade elementary school. Sampling was done using the cluster random sampling technique, with the final sample being 28 students as the control group and 28 as the experimental group. Data collection in the study was carried out using the test method, with an objective test research instrument in the form of multiple choices. The techniques used to analyze the data were descriptive statistical and inferential statistics. The results showed significant differences in the competence of science knowledge between students who were treated using the Scramble Type Cooperative learning model and students who were not given the treatment in the form of the Scramble Type Cooperative learning model. Based on these results, the Scramble Type Cooperative learning model has a significant positive impact on increasing the competence of science knowledge in elementary school students.

1. INTRODUCTION

Education is an effort made to empower humans to create a process of changing behavior towards a better one. In Indonesia, education is done through a direct teaching and learning process

between educators and students in a learning environment (Lestari, 2018; Sujana, 2019). In addition, education in Indonesia is also carried out through the implementation of the 2013 curriculum, which emphasizes the active role of students during the learning process (Pane & Dasopang, 2017; Semadi, 2019). Good education is education that can develop following the changing times. In the 21st century, as it is today, every aspect of human life is carried out by utilizing technology, including aspects of education (Andrian & Rusman, 2019; Prayogi, 2020; Rahayu et al., 2022). Furthermore, education in the 21st century requires students to be able to master various skills such as creative thinking skills, critical thinking and problem-solving, communication, and collaboration (Angga et al., 2022; Septikasari & Frasandy, 2018; Sole & Anggraeni, 2018). These four thinking skills will help students develop cognitive, affective, and psychomotor abilities (Rahmawati & Atmojo, 2021; Widodo et al., 2020). Elementary school students can develop the four thinking skills through the science learning process.

Natural science is one of the subjects that discusses various natural phenomena which are systematically arranged based on the results of observations made (Adriyani et al., 2020; Jannah & Atmojo, 2022). Science education in elementary schools aims to instill various scientific concepts through thinking critically and systematically (Narut & Supradi, 2019; Primayana et al., 2019). Science learning can provide meaningful learning concepts for students because, in the science learning process, students can scientifically explore the environment and nature (Ayu et al., 2021; Dwiqi et al., 2020; Supardi, 2017). The level of student's ability in the science learning process can be seen from the knowledge competence shown by students. Knowledge competence refers to students' achievement or mastery of learning aspects, including memory, understanding, application, analysis, synthesis, and evaluation (Dewi & Negara, 2020; Saputra et al., 2021; Widiana et al., 2019). Science knowledge competency relates to everything students understand about science learning so that the knowledge competence possessed by student teachers can determine the achievement of learning objectives (Setianingsih et al., 2019; Wulantari et al., 2019). Teachers must create meaningful learning processes to increase students' knowledge competence by applying appropriate media and learning models (Diyantari et al., 2020; Suantara et al., 2019).

The reality on the ground shows that the science knowledge competence of elementary school students is still relatively low (Cemara & Sudana, 2019; Widiartini et al., 2019). It is in line with the results of observations and interviews conducted at SD Gugus III, North Kuta District. The observations and interviews show that the science knowledge competency of sixth-grade students at SD Gugus III, North Kuta, still needs to be higher. It is indicated by the participants' low interest and learning outcomes in the science learning process. Furthermore, the results of observations and interviews show that the low competence of students' knowledge of science is caused by students needing to be more interested in the teacher's learning process. The learning process is still teacher-centered, and students are only directed to record and memorize the material presented. If allowed to continue, such a learning process will certainly impact not achieving learning objectives and the low quality of learning in educational units. To overcome these problems, we need a learning model that suits the needs and characteristics of students. The learning model is a conceptual framework used to systematically carry out the learning process to achieve learning objectives related to syntax, social systems, reaction principles, and support systems (Santika, 2018; Widiartha, 2018).

One learning model that is suitable to be applied in science learning for elementary school students is the scramble-type cooperative learning model. Scramble is a learning model that invites students to find answers through problem-solving (Manalu & Siregar, 2019; Pasani et al., 2018). The scramble learning model is carried out by randomly giving students question cards and answer cards, which students are directed to look for and match between questions and answers (Anisah & Syafitra, 2022; Pasani et al., 2018; Rahmaniati et al., 2018). Such a learning process can encourage students to think quickly and precisely to solve existing problems. In addition, the scramble learning model also emphasizes the process of collaboration between students and their groups through the process of answering questions or questions with answers in the form of scrambled letters, words, or sentences so that they become complete and meaningful words, sentences, or paragraphs (Apriyanti, 2019; Sinaga et al., 2020). Through the scramble model, the teacher can increase students' concentration and speed of thinking by combining the abilities of the right and left brains (Salamah, 2021; Shintia et al., 2019).

Several studies have previously revealed that applying the scramble model in learning mathematics can significantly foster students' character of responsibility and discipline (Pasani et al., 2018). The results of other studies also revealed that the scramble learning model using wayang hero media could significantly improve social studies learning outcomes for fifth-grade elementary school students (Rahmaniati et al., 2018). The results of other studies revealed that the scramble learning model applied in social studies learning in elementary schools was able to improve student learning outcomes (Anisah & Syafitra, 2022). Based on some of the results of these studies, the scramble learning model is

effectively used to improve student learning outcomes. In previous research, no study specifically discussed increasing the competence of scientific knowledge through the scramble-type cooperative learning model for sixth-grade elementary school students. So this study focused on this study to know the effect of the scramble-type cooperative learning model on the science knowledge competence of sixth-grade students in elementary school.

2. METHOD

This research belongs to quantitative research with a quasi-experimental design and a non-equivalent control group design. The Scramble-type cooperative learning model is a type of cooperative learning designed to influence student interaction patterns. It is an effective way to vary the atmosphere in class discussion patterns. This model can also be combined with Contextual student worksheet media, which can gain experience and train them to express their opinions to become more active in participating in the learning process. The population in this study was 448 sixth-grade elementary school students from SD Gugus III, North Kuta.

Sampling in the study was carried out using the cluster random sampling technique. After random selection of the seven schools in Gugus III, North Kuta, it was found that the experimental group selected was the sixth grade of SD Negeri 1 Kerobokan Kaja, with 28 students. Moreover, the selected control group was the sixth grade of SD Negeri 3 Kerobokan Kaja, with 28 students. This study consisted of two research variables: the independent variable (Scramble type Cooperative learning model) and the dependent variable (results of science knowledge competence). Data collection in the study was carried out using the test method, with the research instrument being an objective test in the form of multiple choices. The data obtained in the study were then analyzed using descriptive statistical analysis techniques and inferential statistics.

3. RESULTS AND DISCUSSION

Results

The data analyzed in this study were data from students' science knowledge competency results. To obtain this data, a science knowledge competency results test was used as a multiple choice objective test including four answer choices (a, b, c, d). Before the test is used, instrument testing is carried out, which consists of: First, a validity test which includes content validity is carried out to determine the accuracy and accuracy of a measuring instrument in carrying out its measuring function; item validity is a level that indicates how far the items can consistently measure what should be measured. The product-moment correlation formula is used to measure the validity of the science knowledge competency test items in the form of multiple-choice objectives. The scores were then compared with those obtained from the r_{table} , with a significance level of 5%. If $r_{count} > r_{table}$ means valid, and $r_{count} < r_{table}$ means invalid. Of the 40 questions that have been tried out, ten are invalid, and 30 are valid.

Second, the reliability test of the formula used is Kuder Richardson 20 (KR-20). Of the 30 questions declared valid and met the criteria, $r_{1.1} = 1.23$ was obtained, meaning that the multiple-choice test questions in this study were classified as reliable with very high degrees of reliability. Third, test the difficulty level of the items, which can describe the number of test takers who can answer correctly. A good question is a question that has balanced discriminating power. The difficulty level aims to determine whether an instrument is too difficult or too easy for students to be given an instrument. After testing the items, there were nine items in the easy category and 21 items in the moderate category out of 30 test items that were appropriate to use. The fourth test is the differential power test, which refers to the test's ability to distinguish between clever and less intelligent students. It implies that if the test is given to children who are classified as smart, they will answer more correctly, whereas if it is given to children who are classified as less intelligent, they will answer more wrongly. Of the 30 questions that were valid and tested for the power of difference, 17 items had good criteria, and 13 items had fairly good criteria.

Data on the results of science knowledge competencies that have been collected are then analyzed using the t-test. Before being analyzed, a data analysis prerequisite test was carried out, which included a data distribution normality test and a variance homogeneity test. The normality test for data distribution was carried out using the chi-square formula. The test criteria are if $\chi^2_{hitung} < \chi^2_{tabel}$ the data is normally distributed at a significance level of 5% with degrees of freedom (dk) = 5. Furthermore, in the homogeneity of variance test, the criteria for testing the homogeneity of variance are if $F_{count} > F_{table}$, then the criteria for testing homogeneity are said to be homogeneous. The next analysis tests the research hypothesis, a temporary answer to the research problem formulation. Statistical hypothesis testing was

carried out after the normality and homogeneity tests were conducted using the t-test with the separated variance formula. With the criteria, if $t_{count} > t_{table}$ at a significance level of 5% with $dk = n_1 + n_2 - 2$, then H_0 is accepted. Three research data were collected: pretest, post-test, and students' science knowledge competency. Giving a pretest aims to obtain data that is analyzed to conclude the initial abilities of the mathematical knowledge competence of students in the experimental and control classes regarding geometric material.

Based on the results of the data analysis, it can be seen that the range of scores (range) in the post-test is 10. The mean value (mean) in the post-test data is 18.03. The median value in the post-test data is 19.00. The value that often appears (Mode) in the post-test data is 20. The standard deviation of the post-test data is 3.32. After obtaining the results of the pretest of science knowledge competence in the control group, the research analysis was then continued with the analysis of the pretest of science knowledge competency in the experimental group and the normality test of data distribution. The results of the analysis of the normality test for data distribution can be seen in [table 1](#).

Table 1. The results of the normality test for the distribution of post-test data for the experimental and control groups

No	Science knowledge competency data	χ^2_{count}	χ^2_{table}	Conclusion
1	Post-test Experiment	4.60	11,07	Normal
2	Post-test Control	7.07	11,070	Normal

Based on the results of the data analysis, the post-test data scores obtained from the experimental and control groups were normally distributed. Science knowledge competency data that has been collected was analyzed using the t-test. Before being analyzed, prerequisite tests were carried out, which included the normality test of data distribution and the homogeneity of variance test. Test criteria if $\chi^2_{count} < \chi^2_{table}$ with a significance level of 5% ($dk = \text{number of classes minus parameters, minus 1}$), then the data is normally distributed. Meanwhile, if $\chi^2_{count} \geq \chi^2_{table}$, then the distribution of data is not normally distributed. Based on the results of calculations using the Chi-Square formula, data was obtained from the pretest and post-test results of the experimental and control groups. The results of the normality test analysis for the distribution of pretest and post-test data for the experimental and control groups are presented in [table 2](#).

Table 2. The results of the normality test for the distribution of pretest data for the experimental and control groups

No	Group	χ^2_{count}	χ^2_{table}	Conclusion
1	Pretest Experiment	3.47	11.07	Normal
2	Pretest Control	1.74	11.07	Normal

Based on the table above, the pretest data scores of the experimental and control groups are normally distributed. Based on the table above, the post-test data scores of the experimental and control groups are normally distributed. The next analysis is the homogeneity test on the variance of pairs between the experimental and control groups. The test used is the F test with homogeneous data criteria if $F_{count} < F_{table}$. Recapitulation of the results of the pretest and post-test homogeneity of variance tests between the experimental and control groups. It is known that the F_{count} of the results of the pretest and post-test of the experimental and control groups is 1.14 and 1.22 while the F_{table} at $db_{numerator} = k - 1 = 2 - 1 = 1$, $db_{denominator} = n - k = 56 - 2 = 54$, and a significance level of 5% is 1.922. It means that the variance of the science knowledge competence data of the experimental and control groups is homogeneous. After obtaining the results of the homogeneity test, the analysis then proceeds to the assumption test of the research results, which can be that the distribution of data is normally distributed and the variance is homogeneous. Based on this, hypothesis testing is done using the t-test. The pretest and post-test data were analyzed using the gains score to measure students' ability about the material being studied before and after treatment. It was found that the pretest and post-test data gains of the experimental class were greater than the control class, so the results of the gains score analysis were then analyzed using the t-test. Suppose it is proven that the two samples are normally distributed and come from populations with homogeneous variations. The t-test analysis is used with a significance level of 5% with the empirical research formula because $n_1 \neq n_2$. Criteria if $t_{count} < t_{table}$, then H_0 is accepted and H_1 is rejected, and if

$t_{count} > t_{table}$, then H_0 is rejected, and H_1 is accepted. The test was carried out at a significance level of 5% with degrees of freedom $dk = n_1 + n_2 - 2$. The results of the t-test analysis showed that the t_{count} was 3.96 with a significance level of 5%, and the t_{table} was 2.00. It shows that $t_{count} > t_{table}$ so that H_0 is rejected and H_1 is accepted. So, the scramble-type cooperative learning model significantly influences the science knowledge competence of sixth-grade students at SD Gugus III, North Kuta, Academic Year 2022/2023. After all the data had been analyzed, the science knowledge competence results of students who were taught using the scramble-type cooperative learning model with students who were taught not using the scramble-type cooperative learning model showed a significant difference.

Discussion

Based on the results of the data analysis carried out, it was found that there were differences in the two sample groups, the experimental class, and the control class, due to the treatment of learning by applying the scramble-type cooperative learning model, which invites students to understand, find out and solve the problems given by discussing and working with group members. In learning activities with the cooperative model, students form groups, with each group consisting of 2 to 5 students with different abilities for each student, with the aim that each group member can work with everyone (Manalu & Siregar, 2019; Pasani et al., 2018). Each group in the learning process in the classroom will discuss and think about solving the problem given by the teacher. Each student is required to be able to express his opinion with other group members so that later they will find conclusions from the opinions that have been given so the problems given by the teacher will be resolved (Anisah & Syafitra, 2022; Pasani et al., 2018; Rahmaniati et al., 2018).

The purpose of the cooperative learning model is to form a group to provide opportunities for students to be directly involved and engage students in the process of thinking and solving problems in class, along with other themes (Apriyanti, 2019; Sinaga et al., 2020). In this learning model, most learning activities are student-centered, in which students actively solve problems and discuss and study the material provided by the teacher during the learning process (Salamah, 2021; Shintia et al., 2019). This scramble-type cooperative learning model is suitable for students because elementary school students are at the stage of concrete operational development (Adnyani et al., 2020; Zainudin, 2018). The scramble model invites students to look for answers to a question as a form of collaboration, using worksheets where the answers are randomly arranged (Farika, 2021; Kertiari et al., 2020). Thus, the scrambling method can increase students' insight into thinking in solving problems given by the teacher according to the cards that have been prepared. In learning using the scramble-type cooperative learning model, students are invited to play to find terms or answers provided to answer questions to help students understand the material well.

This scramble learning model invites students to learning activities in the classroom to solve problems or find answers related to questions given by the teacher, in which the teacher has provided cards containing question sheets and answer sheets. The implementation of this learning model is carried out by combining games with working in groups. The results obtained in this study are in line with the results of previous research, which also revealed that applying the scramble model in the mathematics learning process could significantly foster students' character of responsibility and discipline (Pasani et al., 2018). The results of other studies also revealed that the scramble learning model using wayang hero media could significantly improve social studies learning outcomes for fifth-grade elementary school students (Rahmaniati et al., 2018). The results of other studies revealed that the scramble learning model applied in social studies learning in elementary schools was able to improve student learning outcomes (Anisah & Syafitra, 2022). Based on the research analysis results supported by previous research, the scramble learning model effectively improves student learning outcomes.

4. CONCLUSION

The research and discussion results show that the scramble-type cooperative learning model affects science knowledge competence in sixth-grade elementary school students. The scramble-type cooperative learning model that is well implemented can improve the competence of science knowledge in sixth-grade elementary school students.

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