Creative Problem-Solving Learning Model Assisted With Multimedia To The Competency Of Science

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A B S T R A K

Model pembelajaran dan media pembelajaran dua komponen yang tidak bisa dipisahkan dari pembelajaran, proses pembelajaran yang dilakukan tidak menggunakan media dan model inovatif akan berpengaruh terhadap kompetensi IPA. Sehinga, dilakukan penelitian dengan tujuan menganalisis pengaruh model *Creative Problem Solving* berbantuan multimedia terhadap kompetensi pengetahuan IPA siswa. Penelitian ini merupakan jenis penelitian eksperimen semu dengan bentuk *nonequivalent control group design.* Populasi yang digunakan adalah seluruh siswa kelas IV berjumlah 468 siswa dan pengambilan sampel melalui teknik random sampling dengan kelompok eksperimen berjumlah 32 siswa dan kelompok kontrol jumlah 33 siswa. Metode pengumpulan data yang digunakan adalah metode tes dengan jenis tes objektif dalam bentuk pilihan ganda biasa, yang kemudian dianalisis menggunakan uji t. Berdasarkan hasil perhitungan diperoleh t_{hitung} = 4,200 dan t_{tabel} = 2,000 pada taraf signifikansi 5% dengan dk = 63. Hal tersebut berarti t_{hitung} = 4,200 > t_{tabel} = 2,000. Simpulan penelitian ini adalah terdapat pengaruh model *Creative Problem Solving* berbantuan multimedia terhadap kompetensi pengetahuan IPA siswa kelas IV sekolah dasar.

A B S T R A C T

The learning model and learning media are two components that cannot be separated from learning. The learning process that is carried out does not use media, and innovative models will affect science competence. Thus, research was conducted to examine the effect of the Creative Problem Solving model assisted by multimedia on students' science knowledge competency. This research is a type of quantitative research that is quasi-experimental with the nonequivalent control group design. The population used was all fourth-grade students totaling 468 students. The sampling was random sampling techniques with 32 students in the experimental group and 33 students in the control group. The data collection method used is the test method with the type of objective test in ordinary multiple-choice, then analyzed using the t-test. Based on the calculation results obtained tcount = 4,200 and ttable = 2,000 at the 5% significance level with dk = 63. This means tcount = 4,200> ttable = 2,000. This study concludes that there is an effect of the Creative Problem Solving model assisted by multimedia on the competence of science knowledge of grade IV elementary school students.

1. Introduction

Education has a very important position and can influence the development of human life. Through education, a person's creativity will be stimulated to continue to innovate with science. Education is often used as a measure of the progress and welfare of a country. Therefore, it is important to improve the quality of education to advance the nation and state. Education is a systematic, planned and continuous effort throughout life to guide students to become mature and virtuous individuals (Kurniawan, 2018; Suparlan, 2017; Widowati et al., 2017). To achieve these things, efforts are made to achieve educational goals and develop students' potential aspects, including knowledge, attitudes, and skills.

The curriculum becomes one of the systematic guidelines in the learning process. The curriculum is design and systematic about learning objectives, learning methods, learning materials, and strategies used as guides or guidelines for implementing the learning process to achieve predetermined educational goals. At this time, the Indonesian state education system applies the 2013 curriculum or K13. The 2013 curriculum is a series of plan improvements to the curriculum initiated in 2004, the competency-based curriculum, which was later refined with the Kurikulum Tingkat Satuan Pendidikan (KTSP). The learning process in the 2013 curriculum uses thematic learning with a scientific approach. Thematic learning

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applies themes to link one subject to another. Therefore students gain meaningful experiences as reflected in the available themes. In the 2013 curriculum, students are required to be more active. Teachers must be able to practice each learning material and act as facilitators for students because students are required to be more active in learning activities, so an approach is needed that is truly able to arouse student activity and develop competencies possessed by students (Kurniaman & Noviana, 2017; Morelent & Syofiani, 2018; Sugiyanto et al., 2015).

Competence is used as a benchmark in learning, the extent to which students can find out their learning outcomes. (Adnyani et al., 2017; Kawi, 2019; Widiana et al., 2019) States that competence is the aspect of skills, knowledge, and scores that can describe students' power in acting and thinking. In competence, many complex things are divided into several aspects. In the 2013 curriculum, competencies are translated into four aspects, : (1) Core-1 Competence (KI-1), the competence of spiritual attitudes; (2) Core-2 Competencies (KI-2), competence in social attitudes; (3) Core-3 Competencies (KI-3), knowledge competencies; (4) Core-4 Competencies (KI-4), skills competencies (Anggara et al., 2018; Pratiwi et al., 2017; Rohmi, 2017). Competence can be defined as students' ability to think, behave and work, which includes actualizing knowledge, attitudes, and skills. Knowledge competence can measure students' ability to understand and master learning material. Knowledge competency is related to the cognitive domain that can measure student achievement in the knowledge aspect. One of the subjects learned in elementary school is Sciences (IPA).

Science (IPA) is a scientific discipline that reviews nature in an integrated manner, not only as a mastery of science related to concepts, principles, and facts, but science is also related to a process of discovery. (Diantari, 2017; Diawati, 2018; Novili et al., 2016). Science can be said to be a scientific discipline that is composed of a collection of results of observations and experiments that are organized and generally applicable. Based on this, it indicates that all activities in science are related to observation and experiment. Science is a collection of knowledge related to living things and how to solve a problem, work, and think. To increase competency in science knowledge, a tactic is needed. Teachers' tactics are using learning models and learning media that can motivate students to carry out active and fun science learning activities. Innovative efforts applied when teaching students are learning models, attractive and fun learning media that are still educational. An atmosphere of science learning in schools can be created that can arouse students to learn actively and develop students' curiosity. (Arisantiani et al., 2017; Cahyadi, 2016; Wahyuni, 2018).

Based on observations on Thursday, October 24, 2019, in fourth-grade SDN Gugus I, Kecamatan Kuta Utara, which consists of 7 SDNs, student learning outcomes, especially students' competency in science knowledge, are still low. It is based on the competence of science knowledge obtained by most students who have not achieved the minimum completeness criteria (KKM) set by each school. Based on the competency data of students' science knowledge obtained during observation, from a total of 468 fourth grade students of SDN Gugus I North Kuta, with a percentage of 51% being students whose knowledge competencies had not been completed from the KKM, therefore it is necessary to improve the learning process.

Based on the problems described, there is a need to implement an innovative learning model to develop students' competency in science knowledge. To improve the competence of students 'science knowledge, a learning innovation is needed, effective learning for science learning, which of course influences the competence of students' science knowledge. In the teaching and learning process, most learning models can increase student activeness in learning activities, one of the innovative learning models is the Creative Problem Solving model. (Indayatmi, 2017; Nurdin et al., 2020; Yuliani et al., 2019).

Creative Problem Solving is a type of learning model that emphasizes problem-solving with creative ideas to solve a problem (Budiarti, 2016; Nurdin et al., 2020; Yuliati & Lestari, 2019). With the creative problem-solving model's application, it is hoped that students can demonstrate problem-solving skills by developing their opinion when asked a question. Problem-solving skills can expand students' thinking power because they are not just memorizing without thinking. Learning in the creative problem-solving model invites students to be active in learning activities to spur students to evaluate the concept of understanding they get. Learning with Creative Problem Solving can build meaning or understanding of students' concepts based on information or initial knowledge they have, then combine new knowledge concepts with the concept of initial knowledge that students already have. Systematic problem-solving in collecting creative ideas in learning activities, therefore students can apply learning that focuses on providing direct experience to increase their competence to understand nature scientifically so that learning activities become meaningful (Indayatmi, 2017; Syazali, 2015; Wasiran & Andinasari, 2019).

(Indayatmi, 2017; Nurdin et al., 2020; Yuliani et al., 2019) States that the syntax or stages of the Creative Problem Solving learning model are: (1) the problem clarification stage; (2) the stage of expressing opinions; (3) the evaluation and selection stage; and (4) the implementation stage. The

benefits of implementing the Creative Problem Solving model based on the learning syntax include: (1) students are more active when learning because students experience solving themselves based on their experiences; (2) the learning process is interesting because it is done not only in the classroom; (3) improve students' creative and critical thinking skills in solving problems; (4) students interact more with each other because they discuss solving strategies at each stage of problem-solving and (5) students can apply their knowledge or concepts to real situations.

Learning through the Creative Problem Solving model requires students to be active in the learning process, which can encourage students to test their knowledge and recognize mistakes in thinking to grow thinking power to solve a problem. Learning activities that implement the Creative Problem Solving learning model will be effective and efficient when using multimedia to learn media. Learning media can help students facilitate the learning process (Budiarti, 2016; Nurdin et al., 2020; Yuliati & Lestari, 2019). Suppose the learning model is implemented with the help of appropriate learning media. In that case, the learning process will be more conducive, efficient, effective and can improve the quality of learning. Learning media will be more interesting and fun, especially using multimedia learning, technology-based learning media.

Multimedia capabilities can convey knowledge and information using text, video and audio as an integrated media. Multimedia is a learning media that combines one type of media with other media types in an integrated manner in the learning process. Multimedia can increase student motivation and bring science learning towards a more tangible direction so that students are more active in learning and imagine or know theories and see the real picture (Akbar, 2016; Anggraeni et al. In the previous learning process, the teacher used textbook media in learning, resulting in students still being slow in capturing the material. Students were only presented with abstract science concepts, making students less developing a mindset through their potential. The use of multimedia will provide a different experience that can facilitate students' learning processes and improve students' science knowledge competency.

The advantages of learning in the use of multimedia are: 1) able to improve memory; 2) convey knowledge and information in reality; 3) can effectively help students to achieve learning goals; 4) fostering student motivation; 5) is interactive, fun; 6) can support individual or group learning activities (Firdaus et al., 2020; Nopriyanti & Sudira, 2015; Rante et al., 2013). The research was carried out on creative problem-solving learning models assisted by multimedia on science knowledge competencies.

This research is supported by several studies relevant to this research, , the first research conducted by (Indayatmi, 2017), who obtained research results that using creative problem-solving learning models can increase student activity and learning outcomes titrimetric analysis. Both studies were conducted by (Nurdin et al., 2020), who obtained the study results that the creative problem solving (CPS) model affects critical thinking skills in high school students' initial mathematical abilities. The three studies conducted by (Budiarti, 2016) obtained research results that creative problem solving (CPS) learning affects students' creative thinking abilities.

The purpose of this study was to analyze the effect of the multimedia-assisted Creative Problem Solving learning model on the fourth-grade students' competency in science knowledge of SDN Gugus I North Kuta for the 2019/2020 academic year.

2. Method

This research is an experimental study using a quasi-experimental research design. Quasi-experimental has a control group but cannot control it thoroughly about variables originating from the outside (external) environment to influence the research (Christiana et al., 2014; Ramlawati et al., 2017; Sayekti & Kinasih, 2018). This is due to researchers' limited ability to pay attention to each student's behaviour, especially when not in school.

This study's population was all fourth-grade students of SDN Gugus I North Kuta for the 2019/2020 academic year, which consisted of 14 classes with 468 students. The sampling technique was carried out through random sampling techniques. (Dole et al., 2017; Maryatun & Metro, 2017; Muslim et al., 2015) interpret random sampling to take research samples by allowing all members of the population to become a sample. The research sample was selected by not randomizing individuals but classes, so the fourth grade SD No. 1 Dalung as a control class and fourth grade SD No. 3 Dalung as an experimental class.

The data collection method in this study used the method of giving tests with data collection instruments for the competence of students' science knowledge in test items, the objective test of the competence of science knowledge. The objective test used in this study, in the form of a regular multiple choice consisting of 4 answer choices (a, b, c or d) and containing one correct answer. An objective test was used to measure students' science knowledge competence, with the usual multiple-choice form. For scoring, 0 for wrong answers and 1 for the correct answer in each item. So that at the end, add up the

scores of each item of the question items. The total score obtained is used as the dependent variable score, the science knowledge competency score that moves from the range of 0 - 100. 0 is the minimum score, while 100 is the maximum score of the science knowledge competency test.

The data obtained were then analyzed using quantitative statistical data analysis techniques using the t-test. This data analysis technique was used to analyze the effect of the multimedia-assisted Creative Problem Solving learning model on the fourth-grade students' competency in science knowledge of SDN Gugus I North Kuta for the 2019/2020 academic year.

3. Result and Discussion

The data obtained in this study were grouped into two groups, : (1) the competence of the science knowledge of students who took part in learning using the multimedia-assisted Creative Problem Solving learning model; and (2) the competence of the science knowledge of students who take lessons using conventional learning.

The study's experimental group was the fourth grade SD No. 3 Dalung, totaling 32 people. In this group, firstly given a pretest after being equal followed by the treatment of the multimedia-assisted Creative Problem Solving learning model up to 6 times the treatment. This study's control group was the fourth grade SD No. 1 Dalung, totaling 33 people. A pretest was given first after being equivalent followed by conventional learning for up to 6 meetings in the control group. At the end of the study, the group was given a post-test to obtain data on science knowledge competency. The following is a description of the experimental group's data and the control group in Table 1.

Table 1. Experimental and Control Group Data

Statistic	Science Knowledge Competencies	
	Experiment Group	Control Group
Mean	84,22	77,03
Standard Deviation	7,08	6,72
Variance	50,18	45,22
Highest Score	97	92
Lowest Score	68	62

The assumption test is carried out after the prerequisite tests are fulfilled, the normality test and the homogeneity test. The data distribution normality test was applied to two groups, including group data learned through the multimedia-assisted Creative Problem Solving learning model with group data learned through conventional learning. The normality test was carried out to determine the distribution of data on the competency score of science knowledge with normal distribution or not. Chi Square test is used to analyze the normality of data distribution. The following is a recapitulation of the experimental group's normality test results and control group data distribution in Table 2.

Table 2. Normality Test of Posttest Data Distribution

No.	Sample	X^2_{hit}	X^2_{tabel}	Result
1	Kelas IV SD No. 3 Dalung (Kelompok Eksperimen)	4,81	11,07	Normal distributed
2	Kelas IV SD No. 1 Dalung (Kelompok Kontrol)	1,68	11,07	Normal distributed

Based on Table 2, the distribution of post-test data for the experimental group is X^2_{hit} = 4.81, while the table score is X^2_{tabel} = 11.07. Based on this, $X^2_{hit} < X^2_{tabel}$ means that the data is normally distributed. The calculation of the normality test of the post-test data distribution in the control group is X^2_{hit} = 1.68, while the table score is X^2_{tabel} = 11.07. Based on this, $X^2_{hit} < X^2_{tabel}$, then the data is normally distributed.

The homogeneity test of variance was analyzed using the F test. Recapitulation of the homogeneity test results of the post-test score of the science knowledge competency in the experimental and control groups is shown in Table 3.

Table 3. Posttest Variance Homogeneity Test.

No.	Sample	S^2	dk	F_{hit}	F_{tabel}	Result
1	Kelas IV SD No. 3 Dalung (Kelompok Eksperimen)	50,18	31	1,11	1,76	Homogen

No.	Sample	S^2	dk	F_{hit}	F_{tabel}	Result
2	Kelas IV SD No. 1 Dalung (Kelompok Kontrol)	45,22	32			

Based on the calculation results obtained F_{hit} = 1.13 then compared with the score of F_{tabel} in the numerator dk (n_2 – 1) = (32 – 1) = 31 and dk denominator (n_1 – 1) = (33 – 1) = 32 at the significance level 5%, then the obtained F_{tabel} = 1.76. From the results of the calculation, the score of $F_{hit} < F_{tabel}$ The post-test score data of the fourth-grade students of science knowledge competence in the experimental group with the control group has a homogeneous variance.

The experimental and control groups fulfilled the normality test (normal distribution) and the homogeneity test of variance (homogeneous variance) as a prerequisite test for hypothesis testing. To test the hypothesis, statistical analysis used the t-test, the polled variance formula. The recapitulation of the t-test analysis of the student's competency in science knowledge is presented in Table 4.

Table 4. Results of Data Analysis of Science Knowledge Competence Using the t test

No.	Sample	N	dk	$\overline{X}$	S^2	t_{hit}	t_{tabel}	Result
1	Kelas IV SD No. 3 Dalung (Eksperimen)	32		84,22	50,18			
2	Kelas IV SD No. 1 Dalung (Kontrol)	33	63	77,03	45,22	4,200	2,000	H_0 rejected

Based on the hypothesis test, it is obtained that tcount is 4.200, and at the 5% significance level and dk = 63, it is obtained t table = 2,000, so tcount> ttable, which is 4.200> 2,000. Thus, H0 is rejected. It means that there is a significant difference in the competence of science knowledge between groups of students taught through the multimedia-assisted Creative Problem Solving learning model and groups of students who are taught through conventional learning in class four SDN Gugus I Kuta Utara for the 2019/2020 academic year . It means that there is an effect of the multimedia-assisted Creative Problem Solving learning model on the competence of fourth-grade students of SDN Gugus I Kuta Utara for the 2019/2020 academic year.

Based on the results of data calculations, the average score of students who take part in learning using the multimedia-assisted Creative Problem Solving learning model ($\overline{X}$ = 84.22) while the average score of students who take conventional learning ($\overline{X}$ = 77.03). Based on this, it can be said that the two sample groups have equal abilities, but after each group is given a different treatment so that the results of competency in science knowledge are different. Compared to the two samples, the experimental group has a higher average score than the control group. It is due to the treatment in the form of a multimedia-assisted Creative Problem Solving model that actively involves students in the classroom's learning process. Thus, there is a significant difference in the competence of science knowledge between students taught through the multimedia-assisted Creative Problem Solving learning model and students taught through conventional learning.

In the experimental group, learning activities using the Creative Problem Solving model assisted by multimedia were active and optimal. The Creative Problem Solving Model is learning that focuses on solving problems based on students' creative ideas. The Creative Problem Solving learning model's application during the learning process is active, fun, packaged in learning activities that can increase memory and make learning activities fun, useful, and learning to be meaningful for students. Thus, students can more easily and quickly master the subject matter while applying it in everyday life.

Creative Problem Solving is a type of learning model that emphasizes problem-solving with creative ideas to solve a problem (Budiarti, 2016; Nurdin et al., 2020; Yuliati & Lestari, 2019). With the creative problem-solving model's application, it is hoped that students can demonstrate problem-solving skills by developing their opinion when asked a question. Problem-solving skills can expand students' thinking power because they are not just memorizing without thinking. Learning in the creative problem-solving model invites students to be active in learning activities to spur students to evaluate the concept of understanding they get. Learning with Creative Problem Solving can build meaning or understanding of students' concepts based on information or initial knowledge they have, then combine new knowledge concepts with the concept of initial knowledge that students already have. Systematic problem-solving in collecting creative ideas in learning activities, therefore students can apply learning that focuses on providing direct experience to increase their competence to understand nature scientifically so that learning activities become meaningful (Indayatmi, 2017; Syazali, 2015; Wasiran & Andinasari, 2019).

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The advantages of learning in the use of multimedia are: (1) able to improve memory; (2) convey knowledge and information in reality; (3) can effectively help students to achieve learning goals, (4) foster student motivation; (5) is interactive, fun; (6) can support individual and group learning activities (Firdaus et al., 2020; Nopriyanti & Sudira, 2015; Rante et al., 2013). The research was carried out on creative problem-solving learning models assisted by multimedia on science knowledge competencies.

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The implication of this research is to apply a creative problem-solving learning model assisted by multimedia and increase the competence of students' science knowledge. It can also improve memory, can help students to achieve learning goals and foster student learning motivation.

4. Conclusion

Following the description of the discussion and the results of the research, it can be concluded that there is a significant difference in the competence of science knowledge between groups that are taught using the Creative Problem Solving learning model assisted by multimedia and groups that are taught using conventional learning in fourth-grade students of SDN Gugus I Kuta Utara in the academic year. 2019/2020. It means that there is an effect of the multimedia-assisted Creative Problem Solving learning model on the competence of fourth-grade students of SDN Gugus I Kuta Utara for the 2019/2020 academic year. This research implies that it can improve memory, help students achieve learning goals, and foster student learning motivation.

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