Guided Inquiry Learning Assisted With Mind Mapping Affects On Science's Creative Thinking Ability

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A B S T R A K

Rendahnya kemampuan berpikir kreatif siswa, sehingga diperlukan model pembelajaran dan media pembelajaran yang dapat membuat siswa lebih aktif mengikuti kegiatan pembelajaran. Penelitian ini bertujuan untuk menganalisis pengaruh model pembelajaran inkuiri terbimbing berbantuan peta pikiran terhadap kemampuan berpikir kreatif IPA. Jenis penelitian ini adalah penelitian eksperimen semu dengan desain *Non-Equivalen Post-test Only Control Group Design.* Populasi penelitian ini berjumlah 91 siswa dan sampel pada penelitian ini berjumlah 61 siswa yang diambil dengan teknik *random sampling*. Metode pengumpulan data dilakukan dengan memberikan tes kepada siswa. Instrumen yang digunakan pada penelitian ini adalah instrumen tes berupa tes essay. Data yang diperoleh dianalisis menggunakan analisi statistik inferensial (uji-t). hasil penelitian menunjukkan bahwa t-hitung = 3,021 dan t-tabel = 1,671, sehingga t-hitung > t-tabel (3,021, > 1,671). Dapat disimpulkan bahwa terdapat pengaruh model pembelajaran inkuiri terbimbing berbantuan peta pikiran terhadap kemampuan berpikir kreatif IPA. Implikasi penelitian ini adalah dapat membuat siswa lebih aktif dan senang didalam kegiatan pembelajaran karena model pembelajaran inkuiri terbimbing secara langsung melibatkan siswa dalam menyelesaikan suatu permasalahan.

A B S T R A C T

Students' low ability to think creatively, so we need learning models and learning media to make students more active in participating in learning activities. This study aims to analyze guided inquiry learning models assisted by mind mapping on thinking creatively in Science. This type of research is a quasi-experimental research with a Non-Equivalent Post-test Only Control Group Design design. The study population consists of 91 students. The sample in this study amounted to 61 students who were taken by random sampling technique. The data collection method was done by giving tests to students. The instrument used in this study was a test instrument in the form of an essay test. The data obtained were analyzed using inferential statistical analysis (t-test). The results showed that t-count = 3.021 and t-table = 1.671, so that t-count> t-table (3.021,> 1.671). It can be concluded that there is an effect of a guided inquiry learning model assisted by mind mapping on the ability to think creatively in Science. This research implies that it can make students more active and happy in learning activities. The guided inquiry learning model directly involves students in solving a problem.

1. Introduction

Science is one of the most important subjects to learn since students are still in elementary school because science subjects can make students think critically and solve their everyday lives. Given the importance of science learning, teachers' role in teaching science must make learning interesting so that learning is fun. According to (Cahyadi, 2016; Gunarta, 2019) There are several reasons for the importance of learning Science in Elementary Schools, namely (1) Science can positively help children to understand other subjects, especially language and mathematics, (2) Science in schools is a terminal education for children, and this means only during elementary school they can recognize the environment logically and systematically, (3) Elementary Science can be fun if at the time of learning using learning media. Meanwhile, according to (Mamanda, 2018; Septiawan, 2018) The teacher has several roles, namely, (a) the teacher as a learning resource, this is closely related to the mastery of material that the teacher must have, (b) the teacher as a facilitator, meaning that the teacher plays a role in providing services to facilitate students in the learning process, and (c) the teacher as a class manager means that the teacher must play a role in creating learning scenarios that allow students to learn comfortably, as is the case with science learning, science learning is one of the five subjects that elementary school students must master.

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According to (Setianingsih, 2019; Yupriyanti, 2015), science is a human effort to understand the universe and effort as a field of study that studies natural events to gain knowledge using procedures explained based on reasonings to get conclusions. (Hendawati et al., 2018; Putra, 2017) science is a systematic knowledge about nature, which contains natural phenomena and natural events containing facts, scientific attitudes, and scientific methods. So it can be understood that science learning is learning based on principles and processes, which can foster students' scientific attitudes towards science concepts. Therefore, science learning in elementary schools is carried out on a collection of science concepts.

The problem that is often faced in education, especially in Indonesia, is the learning process's weakness. Based on the results of observations and preliminary interviews with homeroom teachers and students conducted on October 21 to 24, 2019, namely about assignment interviews related to students' creative thinking abilities in the fourth grade of SD Gugus VIII, Kecamatan Buleleng, implementing the 2013 curriculum, the ability to think creatively is still lacking. This statement is supported by document notes which show that the fourth-grade students' science scores at SD Gugus VIII, Kecamatan Buleleng are still low, which can be seen in Table 1.

Table 1. Midterm Scores for fourth grade in Gugus VIII, Kecamatan Buleleng, Kabupaten Buleleng, Academic Year 2019/2020

School name	The number of students	KKM	Number of Students Achieving KKM			
			Students who reach the KKM		Students who do not reach the KKM	
			Student	%	Student	%
SD N 1 Paket Agung	31	70	12	38,70	19	63,33
SD N 2 Paket Agung	31	70	14	45,16	17	54,83
SD N 1 Beratan	12	69	5	41,66	7	58,33
SD N 2 Liligundi	6	68	3	50	3	50
SD N 1 Kendran	10	68	4	40	6	60
Total	**90**	**-**	**38**	**-**	**52**	**-**

Based on Table 1, it can be seen that of the 90 students, 38 students scored above the KKM and 52 students were under the KKM or the minimum completeness criteria set by the school. It means that there are still many students whose grades are below the standard. Therefore the author wants to do research that aims to improve students' creative thinking. What usually hinders students 'creative thinking skills is the fixation of students' answers to the material or concepts in books and other people's opinions not to develop properly. Students do not produce ideas, answers and varying interpretations of one problem.

In addition, the problems found in student schools in solving a student's problem, the teacher only tend to look at the book. Students do not understand the material given well. If this is allowed to happen, it will harm both students and teachers. The negative thing that will happen, especially to students, is decreased student learning outcomes and motivation in the learning process. Therefore, the use of media is very important in learning activities using media. Students can more easily understand the material presented by the teacher. Thus, students' creative thinking skills need to be improved in school by providing students with what is on their thinking. The use of which can develop students' creative thinking skills includes making mind mapping, posters, and other assignments that require students to think creatively. (Putri & Ismawati, 2019; Sariningsih & Herdiman, 2017).

The learning process should be designed to address these problems so that the learning process can be conducive. For this reason, a teacher must master the models, strategies, approaches, methods, techniques and materials being taught, foster student participation and activity towards science concepts. (Burhanah Farida, 2015; Suarmika & Faliyandra, 2016). One way to improve students' creative thinking skills is to use innovative learning models and utilize learning media.

According to (Abdullah, 2017; Asnita, 2016) Inquiry learning model is a learning model that is considered suitable for use in improving students' creative thinking in science subjects, because it involves various class activities, such as asking questions, making observations, researching books and other sources and the inquiry model provides opportunities for students to conduct an investigation or discovery of something themselves directly.

Guided inquiry learning has principles, including: (1) oriented towards intellectual development, (2) interaction principles, both cognitive interaction and social interaction between students, (3) the principle of asking, the teacher gives questions to students to explore and guide the discovery process

students, (4) the principle of learning to think, (5) the principle of openness or freedom for students to carry out experiments according to reason and logic, (6) the principle of using facts in hypothesis testing (Christopel & Kuntoro, 2016; Fitriani et al., 2016). In addition, there are the advantages of the guided inquiry learning model: (1) Learning that emphasizes the learning of cognitive, affective, and psychomotor aspects in a balanced manner to be more meaningful, (2) Providing space for students to learn according to their style, (3) considered following the development of modern learning psychology which considers learning to be a process of changing behaviour thanks to experience, (4) Serving the needs of students who have abilities above average, meaning that students who have good abilities will not be hampered by students who are weak learning (Churiyah, 2015; Kustijono, 2013).

In addition to the learning model applied to the learning process in class and outside the classroom so that it can run well, it is supported by adequate facilities to support success in the learning process. Learning media includes tools that are physically used as intermediaries in delivering information or the content of subject matter in the form of visuals that can be seen. Audio can be heard such as books, magazines, radio, newspapers, videos and much more (Dwicahyani et al., 2019; Ulfah & Soenarto, 2017). Therefore, the use of media during the learning process is very influential in raising students 'curiosity and in bringing up students' creative thinking skills so that the learning process can run optimally. One of the media that can improve the ability to think creatively is using Mind Mapping media, where this media makes it easy for students to concentrate. The manufacturing process is fun because pictures and colours accompany it. The learning that takes place is not boring, and creative thinking students are trained in making mind mapping (Khaulani et al., 2019; Sundari, 2019).

Mind Mapping is a creative learning system according to how our brains work using the brain's potential and capacity correctly and efficiently by using the left brain and right brain (Karlina et al., 2017; Musaffak, 2014). In addition, mind mapping is a tool for exploring students' creativity to think about the material that has been explained or material that the teacher at school has not explained. (Karlina et al., 2017; Wardani et al., 2015).

This research is supported by several previous studies that are relevant to this research, namely: (1) research conducted by (Saraswati et al., 2013), who get the research results that the guided inquiry learning model has an effect on students' mathematics learning outcomes; (2) research conducted by (Safitri, S. R., & Budhi, 2017), who get the research results that the inquiry learning model affects science learning outcomes in terms of student learning independence; (3) research conducted by (Yulianti, 2016), who obtained research results that the environmentally-based guided inquiry model affects the ability to understand concepts and characters. From some of these studies, no research discusses guided inquiry learning models assisted by mind mapping students' creative thinking skills in Science.

The purpose of this study was to analyze the effect of the guided inquiry learning model assisted by mind mapping on the fourth-grade students' ability to think creatively in science at SD Gugus VIII, Kecamatan Buleleng, Kabupaten Buleleng, 2019/2020 academic year.

2. Method

This type of research is a quasi-experimental research with a Non-Equivalent Post-test Only Control Group Design design. This research was conducted in Gugus VIII, Kecamatan Buleleng, Kabupaten Buleleng, the 2019/2020 school year.

The study population consists of 91 students. The sample in this study amounted to 61 students who were taken by random sampling technique. Random sampling is a way of selecting samples carried out in a random way, so that samples can be obtained that represents the population by describing the real situation (Usman, 2015; Yulia et al., 2019).

The data collection method was done by giving tests to students. The instrument used in this study was a test instrument in the form of an essay test. A test instrument in which there are various questions given to students to collect data on thinking creatively in Science.

The data obtained were analyzed using inferential statistical analysis (t-test). The data obtained were analyzed to analyze the guided inquiry learning model assisted by mind mapping on the fourth-grade students' ability to think creatively in natural science.

3. Result and Discussion

The data description of this research includes the scores of students' post-test results due to students who are taught using guided inquiry models assisted by mind maps in the experimental group and students who are not taught using guided inquiry models assisted by mind maps in the control group. To make it easier to understand, a description of the post-test score data is presented in Table 2.

Table 2. Post-test results of students' creative thinking abilities

Descriptive statistics	Experiment Group	Control Group
Mean	37,97	35,1
Median	38,86	35,18
Modde	39,7	35,15
Standard Deviation	3,75	3,42
Variance	14,03	11,69
Highest Score	44	42
Lowest Score	27	25

Based on Table 2 above, it can be seen that: (1) the mean post-test score of the experimental group more than the control group was 37.97> 35.1; (2) the median of the experimental group more than the control group was 38.86> 35.18; (3) the mode of the experimental group more than the control group was 39.7> 35.15; (4) the standard deviation of the experimental group more than the control group is 3.75> 3.42; (5) the variance of the experimental group more than the control group was 14.03> 11.69; (6) the highest score of the experimental group more than the control group was 44> 42; and (7) the lowest score of the experimental group more than the control group was 27> 25.

Before doing the hypothesis test, first do the analysis prerequisite test. Several data analysis requirements must be met, including: (1) normality test, (2) variance homogeneity test. The normality test is carried out to present that the sample comes from a normally distributed population. The data normality test was done using the Chi-Square test (χ^2) *at a significance level of 5% and degrees of freedom dk = (number of classes interval-parameter -1). Data normality testing was carried out on the two data groups, namely the experimental group data and the control group. If χ^2 hitung $< \chi^2$ tabel then the sample comes from a population that is normally distributed.* The variance homogeneity test between groups aims to check the variance similarity between treatment groups. In this study, the homogeneity test was carried out on the pairs' variance between the experimental and control groups. The test used is the F test with the homogeneity test criteria if $F_{hitung} < F_{tabel}$ then the sample is homogeneous. The recapitulation of the results of the normality and homogeneity of the variances is presented in Table 3.

Table 3. Normality and Homogeneity Test of variance

Data Group	Normality test				Homogeneity test			
	Total Sample	X^2_{hitung}	X^2_{tabel}	Kesimpulan	Varians	F_{hitung}	F_{tabel}	Result
Experiment	31	4,934	7,815	Normal	14,03	1,2	1,84	Homogen
Control	31	5,049	7,815	Normal	11,69			

Referring to Table 3 above, it can be seen, namely (1) the normality test results of the post-test data distribution in the experimental group χ^2_{hitung} = 4,934. Based on the table of Chi-Square values, for a significant level of 5% and dk 3 (dk = 6 – 2 – 1= 3) obtained χ^2_{tabel} = 7,815. This shows $\chi^2_{hitung} < \chi^2_{tabel}$ then the data distribution in the experimental group is normally distributed. The calculation of the normality of the distribution of the post-test data in the control group was obtained χ^2_{hitung} = 5,049 at a significant level of 5% and dk = 3 (dk = 6 -2 - 1 = 3), it is known χ^2_{tabel} = 7,815. This means that $\chi^2_{hitung} < \chi^2_{tabel}$ then the data distribution in the control group is normally distributed. (2) The variance homogeneity test results are F_{hit} = 1,2, while Ftab at the 5% significant level was 1.84. These results show $F_{hit} < F_{tab}$ so that Ho is accepted and the variance is homogeneous. Based on the prerequisite test for data analysis, it was found that the learning outcomes of the experimental group and the control group were normal and homogeneous. After the data analysis prerequisite test results were obtained, the analysis was continued with testing the research hypothesis. Hypothesis testing is done using the t-test with the polled variance formula.

Based on this, proceed to test the research hypothesis. Hypothesis testing is carried out using the t-test with the polled variance formula with degrees of freedom (dk), namely (n1 + n2) - 2 at the 5% significant level can be seen in Table 4.

Table 4. T-test results

Group	N	Dk	$\bar{x}$	Variance (s^2)	t-hitung	t-tabel
Experiment	31		37,97	14,03		
		62			3,021	1,671
Control	31		35,1	11,69		

Referring to Table 5 above, it can be seen that the results of the t-test calculation obtained t_{hit} = 3,021 and t_{tab}= 1,67. It shows thit> ttab so that Ho is rejected and H_1 is accepted. This means, there is a significant difference in the ability to think creatively in Science between groups of students who are taught with guided inquiry learning models assisted by mind maps and groups of students who are not taught with guided inquiry learning models assisted with mind maps in fourth-grade elementary school students in Gugus VIII, Kecamatan Buleleng, Kabupaten Buleleng Academic Year 2019/2020.

Learning that is deemed appropriate for use in improving students' creative thinking in science subjects, because it involves various class activities, such as asking questions, making observations, researching books and other sources, as well as inquiry models, provide opportunities for students to carry out investigations or discovery of something itself directly.

Guided inquiry learning has principles, including: (1) oriented towards intellectual development, (2) interaction principles, both cognitive interaction and social interaction between students, (3) the principle of asking, the teacher gives questions to students to explore and guide the discovery process students, (4) the principle of learning to think, (5) the principle of openness or freedom for students to carry out experiments according to reason and logic, (6) the principle of using facts in hypothesis testing (Christopel & Kuntoro, 2016; Fitriani et al., 2016). In addition, there are the advantages of the guided inquiry learning model: (1) Learning that emphasizes the learning of cognitive, affective, and psychomotor aspects in a balanced manner, (2) Providing space for students to learn according to their style, (3) considered following the development of modern learning psychology which considers learning to be a process of changing behaviour thanks to experience, (4) Serving the needs of students who have abilities above average, meaning that students who have good abilities will not be hampered by students who are weak in learning (Churiyah, 2015; Kustijono, 2013).

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Mind Mapping (Peta Pikiran) is a creative learning system according to the way our brains work using the brain's potential and capacity correctly and efficiently by using the left brain and right brain (Karlina et al., 2017; Musaffak, 2014). In addition, a mind map is a tool for exploring the creativity of students to think about the material that has been explained or material that the teacher at school has not explained. (Karlina et al., 2017; Wardani et al., 2015).

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This research implies that it can make students more active and happy in learning activities because the guided inquiry learning model directly involves students in solving a problem..

4. Conclusion

Based on the explanation above, it can be concluded that there is an effect of the guided inquiry learning model assisted by mind mapping on the creative thinking skills of fourth-grade students in SDN

Gugus VIII, Kecamatan Buleleng, Kabupaten Buleleng, in the 2019/2020 academic year according to the average results of the experimental group being greater than the control group. This research implies that it can make students more active and happy in learning activities. The guided inquiry learning model directly involves students in solving a problem.

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