The Effect of Mind Mapping toward Creative Thinking and Learning Outcomes of Pre-Service Elementary School Teacher

Nova Riswanti[1]*, Tampi Prehadini[2], & Vera Yuli Erviana[3]

[1]Master Program in Elementary Education, Universitas Negeri Yogyakarta, Indonesia
[2]Department of Elementary School Teacher Education, Universitas Negeri Yogyakarta, Indonesia
[3]Department of Elementary School Teacher Education, Universitas Ahmad Dahlan, Indonesia

*Corresponding email: novariswanti.2022@student.uny.ac.id

Abstract: The Effect of the Application of the Mind Mapping Method on Creative Thinking Skills and Learning Outcomes of PGSD Students. **Objective:** this study is to determine the effect of the application of mind mapping methods on the ability to think creatively and learning outcomes of PGSD UAD students. **Method:** This research is a quantitative research with the type of research type -Experimental Design One Group Pretest-Posttest. The sample used in this study was PGSD Semester 2 students in the Advanced Social Studies course totaling 29 students consisting of 24 women and 5 men. Pretest and posttest test questions developed by researchers were given to students to obtain research data. Then analyzed using t-test with a significant level of 0.05. **Findings:** The application of mind mapping method improves creative thinking ability and learning outcomes. Conclusion: There is a significant effect on the learning outcomes of UAD students using the mind mapping learning method. **Conclusion:** There is a significant influence on the learning outcomes of UAD students using the mind mapping learning method.

Keywords: creative thinking, mind mapping, social studies learning.

Abstrak: Pengaruh Penerapan Metode Mind Mapping Terhadap Kemampuan Berpikir Kreatif dan Hasil Belajar Mahasiswa PGSD. *Tujuan:* *Penelitian ini bertujuan untuk mengetahui pengaruh penerapan metode mind mapping terhadap kemampuan berpikir kreatif dan hasil belajar mahasiswa PGSD UAD.* *Metode:* *Jenis penelitian ialah penelitian kuantitatif dengan jenis penelitian -Experimental Design One Group Pretest-Posttest. Sampel yang digunakan dalam penelitian ini adalah Mahasiswa PGSD Semester 2 dalam mata kuliah IPS Lanjut berjumlah 29 mahasiswa yang terdiri atas 24 perempuan dan 5 laki-laki. Soal tes pretest dan posttest dikembangkan oleh peneliti diberikan kepada mahasiswa untuk memperoleh data penelitian. Kemudian di analisis menggunakan uji-t dengan taraf signifikanis 0,05.* *Temuan:* *Penerapan metode mind mapping meningkatkan kemampuan berpikir kreatif dan hasil belajar.* *Kesimpulan:* *Terdapat pengaruh secara signifikan terhadap hasil belajar mahasiswa UAD menggunakan metode pembelajaran mind mapping.*

Kata kunci: berpikir kreatif, hasil belajar ips, mind mapping.

■ **INTRODUCTION**

Education plays an important role in the life of the nation, namely to ensure survival which aims to create an atmosphere and learning process where individuals are equipped to develop life skills as a tool to combat poverty and promote the socio-economic development of society (Khoridah et al., 2019; Noor, 2015; Yan et al., 2022). Formally, education starts from early childhood education to higher education to create a generation that is forward-thinking, professional and more competent than its predecessors (Leasa et al., 2021). One of the main, widely accepted goals of education is to provide students with creative thinking skills (Hitchcock 2022; Leasa et al. 2021; Þenel, Gaziantep University, Faculty of Education, & Baðçeci 2019). Creative thinking is also one of the skills that needs to be developed in 21st century education in preparing individuals to compete and survive in the digital era (Orhan Özen 2022; Xu and Zhou 2022).

The ability to think creatively has an important role and equips individuals to participate in the rapidly changing life of a democratic society, for example adding new knowledge and creating solutions to solve problems and developing innovative solutions (Antika et al., 2022; Beghetto, 2021; Davies, 2015; Van Der Zanden et al., 2020, 2020; Wijaya et al., 2021). The ability to think creatively is able to produce various appropriate responses and produce new ideas for students (Febrianti et al., 2016; Pujawan et al., 2022). Furthermore, the positive side of creative thinking is that it increases the ability to see opportunities, face challenges and adapt flexibly to changes in learning, work and life situations (Seechaliao 2017; Yan et al. 2022).

Although creative and critical thinking skills are important for students, the reality is that when entering college, students do not always acquire these skills at a satisfactory level (Van Der Zanden et al., 2020). Even though these skills have been integrated with the skills in Social Sciences courses. This is based on the results of observations and interviews conducted at PGSD UAD Class 2E showing that some students have difficulty developing creative thinking skills. Especially in subjects that require reading. Furthermore, students said that it was difficult to study material about the history of Hinduism, Buddhism, Islam in Indonesia. This is due to the relatively wide coverage of the material, it is necessary to read and memorize the material. The learning process in lectures is still conventional so it is not able to overcome these problems and facilitate students' creative thinking abilities. However, educators are trying to implement several solutions, including through individual assignments and group presentations, discussions and question and answer activities.

Based on these problems, it is necessary to apply learning methods that are able to make students active, think creatively and find their own learning concepts. One of them uses the Mind Mapping learning method. Mind mapping is a learning strategy that is recognized and used by teachers to improve memorization, strong understanding of concepts and stimulate creativity as well as a tool for assessing students' understanding of the topics being taught (Alsuraihi, 2022; Ayal et al., 2016; Dong et al., 2021).

Mind mapping is different from note-taking techniques (Batdi 2015). Mind mapping is defined as a thinking tool, a technique for recording and summarizing visually which facilitates organizing information, analyzing, understanding, synthesizing, developing, initiating, organizing and producing new ideas that are easy to understand, creative and effective (Ayal et al., 2016; Hazaymeh &; Khalaf, 2022; Muassomah et al., 2022; Pribadi &; Susilana, 2021). Furthermore, the mind mapping method is an effective and creative way to map and record information so that it is stored well in long-term memory (Astriani et al., 2020). This is because

students can express and connect ideas freely, rather than line-up and divergent thinking (Leeds, Kudrowitz, and Kwon 2019; Naghmeh-Abbaspour & Rastgoo 2020). Apart from being a note-taking technique, this technique is also considered a useful technique in the fields of creativity, planning and problem solving (Gou &; Jia, 2021; TemiZ & SiVriKaya, 2023). Mind mapping has a clear structure from start to finish, playing a role in guiding student learning individually and in groups to understand and interpret the material read and put into written form (Li &; Si, 2020; Muhlisin, 2019). Mind mapping helps individuals to combine knowledge systematically so that it is clear and easy to understand (Dong et al., 2021). The advantages of applying the mind mapping method include helping to organize, map, memorize, summarize, collect, develop and connect new information or ideas in a meaningful way (Suherman et al., 2021). Apart from that, it also has an impact on the ability to think creatively, solve problems and the ability to see a subject holistically (Batdi 2015).

Mind mapping can be in the form of diagrams or combining images with words to build information including ideas, words, images, colors and symbols which involve the right and left brain to work together to build and extract new information so that the information is organized, easy to remember, understood and becomes your own. students themselves (Astriani et al., 2020; Muassomah et al., 2022; Nie, 2020; Wu &; Wu, 2020; Yunus & Chien, 2016). Mind mapping can produce information with a high level of fluency and originality through complex stages (Malycha &; Maier, 2017). In educational practice, creative thinking is an important key in providing solutions to serious human problems that have an impact on student learning outcomes (Jankowska, Gajda, and Karwowski 2019). For this reason, this research aims to determine the effect of applying the mind mapping method on creative thinking abilities and social studies learning

outcomes of pre-service elementary school teacher.

■ METHODS

Participants

The research sample used was 29 pre-service elementary school students in Universitas Ahmad Dahlan (UAD) consisting of 24 women, 5 men who were taking advanced social sciences courses for the 2022/2023 academic year.

Research Design and Procedures

This research is a quantitative research with a pre-experimental one group pre test posttest design. Data collection through observation, interviews and documentation. Observations were carried out in the Advanced Social Sciences class 2 E. Interviews were conducted with 3 students who took the Advanced Social Sciences lecture. Before the mind mapping method is carried out, students are given pretest questions to determine the student's initial abilities. Next, the lecture process applies a learning method using the mind mapping method, material about the history of Hindu, Buddhist and Islamic kingdoms in Indonesia. At the end of the lesson, students were given a posttest to determine the effect of applying the mind mapping method. To determine the effect of applying the mind mapping learning method on students' creative thinking abilities and learning outcomes, a t test was used using a one group pretest posttest design and calculated the N Gain value from the pretest and posttest scores.

Instrument

The instrument used is a written test in the form of multiple choice questions totaling 10 questions for the pretest and posttest questions. The 10 questions contain material about the history of Hinduism, Buddhism and Islam in Indonesia. The pretest and posttest questions used were developed by researchers. The data collection

techniques used in this research are observation, interviews and documentation. Creative thinking is the ability to see things from different points of view and find innovative solutions (Jankowska, Gajda, & Karwowski 2019). The criteria for creative thinking ability consist of fluency, flexibility, originality and elaboration when developing ideas (Jankowska et al. 2019). The four criteria can be described as follows: fluency, namely the ability to generate many ideas; flexibility, the ability to create diverse solutions; originality, namely being responsible for producing rare ideas; elaboration, the ability to develop ideas. Furthermore, the characteristics of mind mapping as a learning tool include the following: One main idea as the main subject point; break the main subject into several branches; contains words or images that are interconnected in each branch; less important subjects are placed in the form of "twigs"; structure in nodal connections (Bhattacharya & Mohalik 2020). Indicators of creative thinking include providing lots of ideas, expressing new ways, developing ideas and producing alternative answers (Dhayanti, Johar, and Zubainur 2018). In this research, the indicators used are related to creative thinking based on the characteristics of Bhattacharya and Mohalik, namely initial knowledge, including the activity of reading material on the History of Hinduism, Buddhism and Islam in Indonesia which has been divided into several groups followed by determining the main idea, sub-main ideas and keywords; identify and break down the main idea into several branches; write down keywords and link them with supporting images to connect ideas; embed ideas and supporting ideas in different chains;

connect ideas and images into the same idea. Apart from that, the characteristics of fluency, flexibility, originality and elaboration are used as supporting indicators to determine the creativity, flexibility and originality of the mind mapping products created.

Data analysis

The data analysis technique in this research uses the normality test, n gain test, t test and statistical hypothesis test. Normality data is used to determine the type of statistics that will be used and to find out whether the data is normally distributed or not (Nasrum 2018; Nugraha 2022; Purnomo 2016).

■ **RESULTS AND DISCUSSION**

Research data on student learning outcomes was carried out at Kampus 5 UAD which consists of one class, namely class 2 E. Before the research, students were given pretest questions first to determine the students' initial abilities before being given treatment. In all research, treatment is given to the learning process, namely the application of the mind mapping method. Then lectures were carried out using the mind mapping method. At the end of the lecture, a posttest is carried out to determine the students' abilities after being given treatment, namely the application of the mind mapping method. After obtaining data from the pretest and posttest results, a normality test was then carried out to determine that the research class came from normally distributed data. The research data is explained in the table below.

Table 1. Descriptive statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Pretest	29	50	40	90	1920	66.21	2.071	11.153
Posttest	29	50	50	100	2160	74.48	2.021	10.885
Valid N (listwise)	29							

Based on the Descriptive Statistics table above, it shows that from one class which was conducted using an initial test (pretest) and final test (posttest) there was an influence of the application of the Ming mapping method on creative thinking abilities and social studies learning outcomes. This can be seen from the results of the pretest with a total of 29 students, an average of 66.21 was obtained with the highest score being 90 and the lowest being 40 and the standard deviation being 11.153. Meanwhile, the posttest score with 29 students obtained an average of 74.48 with the highest score of 100 and the lowest score of 50 and a standard deviation of 10.885. From the data obtained, it can be seen that the average posttest score is higher than the pretest score. Thus, the mind mapping method can increase students'

understanding of the material being studied. This is in line with the opinion of (Gavens et al. 2022) which states that basically mind mapping is used to develop knowledge and understanding through active student involvement. Apart from that, mind mapping plays an important role in analyzing problems and developing thinking skills (Polat, Sezer, & Atiº Akyol 2022).

Before carrying out the t test which aims to determine significant differences between the pretest and posttest averages, the research data is first tested for normality requirements to determine whether the data distribution is normal or not. This is to find out and prove whether the empirical data that has been obtained has a normal distribution or not (Widana 2020). The results of the normality test are presented in the table below.

Table 2. Normality tests

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.185	29	.013	.936	29	.079
Posttest	.177	29	.021	.933	29	.065
a. Lilliefors Significance Correction						

Based on the sig value. in the table, Shapiro Wilk shows the sig value. for the pretest it has a value of 0.079, while for the sig. posttest showed a value of 0.65. Based on the decision making criteria if the sig value. more than 0.05 then the data is declared normally distributed. Based on these data, the pretest and posttest significance values in the Shapiro Wilk table compared to á = 0.05 are both greater than á = 0.05. So it can be concluded that the research sample data

comes from a normally distributed population. After the normality prerequisite test is met, a hypothesis test can be carried out using the t-test.

Based on the pretest and posttest correlation score in Table 3, it shows the sig. of 0.00. Based on the decision making criteria, the correlation test shows that the sig. less than 0.05 at the 5% significance level, it can be concluded that there is a statistically strong correlation between the pretest and posttest.

Table 3. Pretest and posttest correlation test results

		N	Correlation	Sig.
Pair 1	Pretest & Posttest	29	.675	.000

Table 4. Paired samples test

Table 1. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest - Posttest	-8.276	8.892	1.651	-11.658	-4.894	-5.012	28	.000

Based on table 4, it can be seen that for a significance level of 5%, the sig. 2 tailed is 0.00. Based on the decision making criteria, the output from the t test results of 0.00 is smaller than 0.05. So it can be concluded that there is a significant difference in learning outcomes using the mind mapping method. The difference in the average pretest and posttest before and after treatment, namely the mind mapping method, is 8.276. Meanwhile, measuring how big the changes that occurred after and before implementing the mind mapping learning method was carried out by the N-gain score. Based on the N-gain results, the average value is 24.023. In this case, students still have difficulty understanding the learning material and making concept maps of the material, especially the history of Hinduism, Buddhism, Islam in Indonesia. In reality, learning using mind mapping is used to take notes, summarize discussion topics, collect opinions and perspectives to find solutions, simplify complex ideas, describe general information collected and display information that is easy to understand and creative (Pribadi & Susilana 2021). This encourages students to think creatively and solve problems accurately and quickly and helps students to solve evaluation questions well which has an impact on learning outcomes. The problem in question is related to material on History, Hinduism, Buddhism, Islam in Indonesia, which has a wide range of material. Furthermore, students who think creatively are able to overcome problems from various points of view and produce more innovative solutions so that they have a high level of originality.
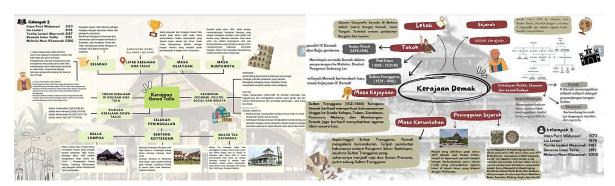

Figure 1. Product results of mind mapping used in this research

Figure 1 shows the results of mind mapping products developed by students regarding the material studied. Both mind maps produce different concept maps. This shows that the differences in mind mapping results are a representation of each student's unique mindset (Widiana & Jampel 2016). The content of the learning material is explained in the form of a concept map briefly, concisely and clearly. The application of this method is effective and efficient in improving understanding of reading texts by obtaining the right information. The procedures for preparing mind mapping include determining the main idea, supporting sub-ideas and keywords, creating branches to connect ideas and clarifying the explanation (Badriyah, Poedjiastoeti, & Yuliani 2021). Making mind maps, both individually and in groups, requires students to understand and remember the material they read and then put it in written form (Muhlisin 2019). The positive side of applying the mind mapping method helps understanding and solving problems by exploring various ideas and combining them (Chen, Subramanian, and Krishnamurthy 2019). Several studies that have been conducted previously explained that mind mapping is useful for developing students' thinking skills such as taking notes, analyzing, completing assignments, preparing for exams and reflecting on students' practice (Rosciano 2015). It was further explained that students who use the mind mapping method become more thoughtful and have effective reading skills. This method is effective and efficient for improving understanding of reading texts by obtaining the right information. Creative thinking which is facilitated through the mind mapping method involves cognitive processes and personality characteristics to generate ideas for solving problems. Other research also shows that there is an increase in cognitive, affective and psychomotor learning outcomes which are influenced by the mind mapping method

(Krisdiyanti, Nuroso, & Reffiane 2019) . Apart from that, research conducted by (Sulfemi 2019) states that the application of the mind mapping method increases student interest, motivation and learning outcomes, especially in social studies learning.

■ CONCLUSIONS

Based on the results of the analysis carried out on research data, it can be concluded that the application of the mind mapping method has a positive impact in improving critical thinking skills and student learning outcomes. The improvement and influence of the mind mapping method is shown by the pretest average of 66.21 which is lower than the average posttest score of 74.48. In addition, the results of statistical analysis using the t test assisted by SPSS 21 show that the sig. < 0.05 so it can be concluded that the application of the mind mapping method improves critical thinking and learning outcomes for preservice elementary school teachers. Specifically, the results of the mind mapping created by each group were different from the mind mapping of other groups. This shows that the mindset and creative abilities of each individual are different.

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