The Influence of the Brain-Based Learning (BBL) Model Assisted by Mind Mapping on Students' Memory Based on Gender

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ABSTRACT

Each student has a unique memory, depending on their response to stimuli. Memory is crucial in the learning process as it directly relates to the material being taught, and the brain plays a vital role in this process. Memory plays a significant role because during exams, students must be able to process their memory to obtain good grades. Therefore, effective learning methods must be employed to optimize student memory. The be optimized as best as possible. The optimal use of the brain in learning can be achieved through the BBL model assisted by mind mapping. The BBL learning model aims to develop five natural brain learning systems that can maximize the brain's potential, and mind mapping is a creative way for students to record lessons and generate ideas. The resulting ideas are expressed in the form of a mind map, which enables students to remember the material more easily. This research aims to determine the effect of implementing the BBL learning model assisted by mind mapping on students' memory, based on gender. This research employs a quantitative approach with a quasi-experimental method, using a one group pretest posttest design. Sample selection was carried out using a purposive sampling technique. The results of the T-Test for Equality of Means show a Sig value. < 0.05 which is 0.00. Thus it can be said that female students have stronger memories than male students.

Keywords: **Brain-Based** Learning (BBL), Mind Mapping, Memory, Gender

1. INTRODUCTION

The objectives of national education are stated in Article 3 of Law No. 20 of 2003, namely developing abilities and forming a dignified national character and civilization in order to make the nation's life more intelligent, aimed at developing the potential to become devoted human beings who believe in and are devoted to God Almighty, possess noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens. Education provides awareness that humans are unique creatures, possessing reason given by Allah SWT, compared to other creatures. Humans are born pure, and their growth process is influenced by their parents and environment.

The brain is a vital organ that regulates the processes of thinking, language, and behavior. Memory is one way to optimize the brain abilities. The background to this research is that each student has different memory abilities, depending on how the student responds to stimuli in the form of information (subject matter). However, not all humans (students) are able to maximize their brain abilities during learning, so that in the learning process students are able to optimize all brain functions well. Memory is crucial in the learning process, as it directly relates to the material taught by the teacher. The part of the body that plays a very important role is the brain, which is divided into three parts: the ability to remember, the ability to be creative, and the ability to think/reason. Memory is very important because during exams students must be able to process their memories. Effective learning strategies must be employed to overcome memory-related problems and optimize students' memory as much as possible.

Initial observations carried out on PGSD FKIP Umuslim students found that during exams, students were unable to process their memories well. This could be seen from the number of questions that students could not answer. Of the 20, only 8 could be solved by

students, and the ones who solved the most questions were female students. Efforts to overcome this problem can be made through optimal use of the brain in the learning process using the BBL model (Hamongan, 2020). Where the BBL learning model aims to develop five natural brain learning systems that can develop the brain's potential to the maximum (H; Diani et al., 2019). Mind mapping is a creative way for students, individually and in groups, to record lessons and generate ideas. The resulting ideas will be expressed in the form of a mind map, which enables students to remember the material more easily. The brain will be trained to think regularly and in balance using the left and right brain (Annisa et al., 2018).

Learning using the BBL learning model, assisted by mind mapping, provides learning that is able to provide students with space to think without burden, a supportive learning environment, and stimuli that stimulate memory. Learning will be carried out by following the following steps: In the first stage, namely pre-exposure, starting with displaying a mind map (*mind map*). The goal is to make connections in the brain about new information that students will receive, so they can search for information about the material before learning takes place. At the initiation and acquisition stages, students are given challenging problems and questions with activities that lead and guide them in solving problems in various ways, stimulating their brain abilities in remembering the material. At the elaboration stage, students will discuss and determine the appropriate strategy to solve the problem. Students receive a solution to a problem, which is followed by the emergence of inspiration and ideas. This initiates and follows the emergence of inspiration and new ideas (Putri et al., 2019). The incubation and memory coding stage, this stage emphasizes time to rest or relax and repeat learning. The verification and checking stage, at this stage an evaluation is carried out on students, and the celebration and integration stage creates activities that instill a love of learning, which is all-important (Rulyansah et al., 2017).

Several studies have been carried out related to the BBL learning model assisted by mind mapping, which has been carried out previously which differentiates it from the research that will be carried out, including research conducted by (Saadah & Isnaeni, 2019) with the title the role of the BBL model in learning the nervous system in increasing students' scientific literacy. As a result, the BBL model can achieve indicators of effectiveness because there is success and linkage of the BBL model to students' critical thinking abilities and curiosity. Next is research (Sakti & Hartanto, 2020) with the title improving civic education learning achievement using the BBL Model. The result was an increase in the learning achievement of Class VII B students at SMP 16 Rejang Lebong Bengkulu, the number of students who completed the pre-cycle was 13 students with a completion percentage of 50.00%. Study (Anggraini et al., 2020) with the title the influence of the BBL learning model and the direct learning model on junior high school students' understanding of concepts. The results showed that there were differences in understanding of concepts between groups of students who studied with the BBL learning model and the direct learning model. 2) The group of students who studied using the BBL learning model had higher scores. This research aims to determine the effect of implementing the BBL learning model, assisted by mind mapping, on students' memory based on gender.

2. LITERATURE REVIEW AND HYPOTHESIS

Brain-Based Learning Model

According to Given (Henda Diani et al., 2019), BBL (Brain Based Learning) model. aims to develop five natural brain learning systems that can maximize the brain's potential to the maximum. The five learning systems are emotional, social, cognitive, physical, and reflective learning systems. These five types of learning influence each other and cannot exist independently. Jensen stated that brain ability-based learning considers what is natural to the

brain and how the brain is influenced by the environment and experience. (Nur, 2016). Furthermore, according to Jensen, there are three main strategies that can be developed in implementing BBL, namely: (1) creating a learning environment that challenges students' thinking abilities; (2) creating a pleasant learning environment; and (3) creating active and meaningful learning situations (Henda Diani et al., 2019). There are seven stages in implementing the BBL model, namely: 1) pre-exposure stage; 2) preparatory stage; 3) initiation and acquisition stages; 4) elaboration stage; 5) incubation stage and inserting memory; 6) verification and confidence checking stage; and 7) enrichment and integration stage.

Memory

Each student has a unique memory, which depends on their ability to respond to stimuli in the form of information. The ability to remember indicates that humans can store and retrieve previously acquired knowledgelearned In the learning process, one thing is very decisive, because memory is directly related to the material taught by the teacher, and the tool that must be used for learning. The brain, which is divided into three parts: 1) the ability to remember, 2) creative ability, 3) the ability to think/reason (Hamonangan, 2020). Memory is very important because during exams students must be able to process their memories. Therefore, memory is crucial in the learning process, and effective learning techniques must be overcome by using effective learning to optimize students' memory. The memory indicator used in this research is the according indicator (Hamonangan, 2020) (1) receive, (2) store, (3) regenerate.

Mind Mapping

According to Svantesson (Rochanah, 2021) Mind mapping or mind mapping is a technique for making notes that can be used in certain situations and conditions, such as in making plans, solving problems, making summaries, making structures, collecting ideas, for taking notes, lectures, meetings, debates and so on. interview. Mind Mapping is the best technique for helping the brain's thinking process regularly because it uses graphic techniques derived from human thought, which are useful for providing universal keys to unlock the brain's potential (Prayudi: 2008). According to Ekawati & Kusumaningrum (Wati, 2021) The mind mapping learning model is a model that focuses on optimizing the work of the brain, namely that the left and right parts of the brain are used simultaneously, so that the formation of knowledge works in a comprehensive and meaningful way.

3. METHODS

This research employs a quantitative approach with a quasi-experimental method, using a one group pretest posttest design. This method is used to obtain data regarding the memory of PGSD students before and after treatment. Before being given treatment, a pretest was given before treatment, followed by treatment using the BBL learning model assisted by mind mapping, and at the end of the learning, a posttest was given. The memory indicators used in this research are (1) receiving, (2) storing, and (3) recalling (Hamonangan, 2020).

The population in this study consisted of all second-semester students in the PGSD study program at Almuslim University. The sample was selected using purposive sampling based on the gender ratio in that semester. The the samples in this study were 15 male and female students each with a total sample size of 30 students.

The instrument used in this research was a student memory questionnaire prepared based on memory indicators in the elementary physics basic concepts course with 15 statements. The quantitative data analysis technique used was the t-test. Pretest and posttest data processing

was carried out using the SPSS version 23.0 for Windows program.

To determine the increase in memory of the students studied, the gain index (N-Gain) was calculated. The aim of calculating the gain index is to determine the increase in pretest and posttest scores for the class under study using the following formula:

$$N - gain = \frac{Posttest - \Pr etest}{Skor\ Maksimum - \Pr etes}$$

The gain index interpretation criteria put forward can be seen in the following table:

Table 1. Gain Index Interpretation Criteria

No.	Range	Category
1	$g \leq 0,3$	Low
2	$0,3 < g \leq 0,7$	Currently
3	$0,70 < g \leq 1,00$	Tall

(Source: Nurhayati et al., 2021)

4. RESULT AND DISCUSSION

To determine the increase in student memory based on gender, the researchers used a gain index calculation which aims to determine the increase in pretest and posttest scores based on the gender of male students and female students. Previously, a normality test had been carried out based on students' pre-test and post-test scores. The pretest scores can be seen in Table 2.

Table 2. Pretest Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest Score	.148	30	.090	.931	30	.052
a. Lilliefors Significance Correction						

Based on Table 2, it can be seen that the pretest sig value is 0.09 > 0.05, so in this case, it can be concluded that the pretest value data is normally distributed. Then the results of the post-test normality test can be seen in Table 3.

Table 3. Posttest Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Posttest Value	.159	30	.051	.944	30	.114
a. Lilliefors Significance Correction						

Based on Table 3, it can be seen that the post-test sig value is 0.051 > 0.05, so in this case, it can be concluded that the post-test value data is normally distributed. Additionally, the t-test values obtained are presented in Table 4.

Table 4. t-test values

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Posttest Value	6.142	29	.000	7.000	4.67	9.33

Based on the student memory indicators based on gender, it can be seen in Table 5 and Table 6. The results of the N-gain analysis show that the average value of women's memory ability reached 0.69 or equal to 0.7, which is in the high category.

Table 5. Impaired memory of female students

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Skor	15	.29	.86	.6973	.12795
Ngain_persen	15	28.57	85.71	69.7270	12.79502
Valid N (Listwise)	15				

Furthermore, the results of the N-gain analysis show that the average value of men's memory ability reaches 0.62 or equal to 0.6, which is in the medium category.

Table 6. Memory impairment in male students

	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	15	.57	.67	.6212	.03497
Ngain_persen	15	57.14	66.67	62.1154	3.49733
Valid N (Listwise)	15				

Based on the results of this analysis, it can be seen that male students' memory is higher than male students. This is in line with research conducted by Mukaromah et al., (2020), with the research title The Impact of the BBL-Mind Map Learning Model on the Critical Thinking Ability of Students with Different Initial Abilities. The results of the research are that there are differences in critical thinking between BBL students with the help of a mind map and without the help of a mind map.

5. CONCLUSSION

with the research title The Impact of the BBL-Mind Map Learning Model on the Critical Thinking Ability of Students with Different Initial Abilities. The results of the research are that there are differences in critical thinking between BBL students with the help of a mind map. Further BBL students without the help of a mind map. Further research was carried out by

6. ACKNOWLEDGEMENT

7. REFERENCES

Anggraini, N., Ristiati, N., & DeVI, D. (2020). Pengaruh Model Pembelajaran Brain Based Learning 9BBL) dan Model Pembelajaran Langsung Terhadap Pemahaman Konsep Siswa SMP. *JPPSI (Jurnal Pendidikan Dan Pembelajaran Sains Indonesia)*, *3*(1), 71–82.

Annisa, R., Heryanto, W., Rusilowati, A., & Subali, B. (2018). Peningkatan Daya Ingat dan Hasil Belajar Siswa dengan Mind Mapping Method Pada Materi Listrik Dinamis. *Jurnal Pendidikan (Teori Dan Praktik)*, *3*(1), 19–23.

Diani, H;, Irwandani, I., & Fujiani, D. (2019). Pembelajaran Fisika Dengan Model Brain Based Learning (BBL): Dampak Pada Keterampilan Berpikir Kritis. *Indonesian of Science and Mathematics Education*, *2*(3), 344–352.

Diani, Henda, Irwandani, I., & Fujiani, D. (2019). PEMBELAJARAN FISIKA DENGAN MODEL BRAIN BASED LEARNING (BBL): DAMPAK PADA KETERAMPILAN BERPIKIR KRITIS. *Indonesian Journal of Science and Mathematics Education*, *02*(3), 344–352.

Hamonangan, R. H. (2020). Peningkatan Daya Ingat Menggunakan Model Pembelajaran Brain Based Learning. *DE_JOURNAL (Dharmas Education Journal)*, *1*(2), 201–208.

Hamongan, R. (2020). Peningkatan Daya Ingat Menggunakan Model Pembelajaran Brain Based Learning. *De_Jurnal (Dharmas Educ Journal)*, *1*(2), 201–208.

Mukaromah, J. L., Ibnu, S., & Subandi. (2020). Dampak Model Pembelajaran BBL-Mind Map terhadap Kemampuan Berpikir Kritis Siswa dengan Kemampuan Awal Berbeda. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *5*(5), 630—636.

Nur, I. R. D. (2016). MENINGKATKAN KEMAMPUAN BERPIKIR KREATIF MATEMATIS DAN KEMANDIRIAN BELAJAR SISWA DENGAN MENGGUNAKAN MODEL PEMBELAJARAN BRAIN BASED LEARNING. *JURNAL PENDIDIKAN UNSIKA]*, *4*, 26–41.

Nurhayati, N., Zuhra, F., & Salehha, O. P. (2021). Penerapan Model Pembelajaran Project Based Learning Berbantuan Geogebra Untuk The Application of Geogebra-Assisted Prject Based Learning Model to Improve Student. *JUPITEK (Jurnal Pendidikan Matematika)*, *4*(2), 73–78.

Putri, C., Munzir;, & S, A. Z. (2019). Kemampuan Berpikir Kreatif Matemtis Siswa Melalui Model Pembelajaran Brain Based Learning. *Jurnal Didaktik Matematika*, *6*(1), 12–27.

Rochanah, S. (2021). Upaya Meningkatkan Daya Ingat Tentang Materi Keseimbangan Lingkungan Dengan Menerapkan Teknik Mind Mapping. *Journal of Education*, *4*(1), 114–127.

Rulyansah, A., Hasanah, U., & Wardana, L. (2017). *Model Pembelajaran Brain Based Learning Bermuatan Multiple Intelegences*. Institut Agama Islam Ibrahimy Genteng Banyuwangi.

Saadah, K., & Isnaeni, W. (2019). Peran Model Brain Based Leaning Pada Pembelajaran Sistem Saraf Dalam Meningkatkan Literasi Sains Siswa. *Jurnal Phenomenon*, *9*(2), 132–149.

Sakti, R., & Hartanto, S. (2020). Meningkatkan Prestasi Belajar PPKN Dengan Menggunakan Model Brain Based Learning. *Jurnal Kewarganegaraan*, *1*(2), 201–208.

Wati, N. N. K. (2021). Dampak Model Pembelajaran Mind Mapping dalam Meningkatkan Hasil Belajar Siswa di Sekolah Dasar. *Journal of Education Action Research*, *5*(4), 440–446.