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Improving the Metacognition Ability of Class VIII Middle School Students on the Use of Function Boards in Mathematics

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ABSTRACT

Metacognition is critical to achieving success in learning, so it is important to examine the activity and growth of metacognition to ensure effective teaching methods that enable students to utilize their information effectively while regulating their metacognitive processes. However, in reality, students' metacognitive capacity is still lacking. One important component to improve students' metacognition is their initial knowledge about the material being studied. Various ways are used to convey material, one of these ways is by using educational media. The board functions as a pedagogical tool in mathematics education, specifically designed to illustrate abstract understanding of relationships and functions to middle school students in grade 8. The research methodology used is quantitative research using Pretest-Posttest Control Group Design. This design involves two different groups or classes: the experimental class and the control class. The research focused on the population of class VIII students at SMP Negeri 1 Sumedang. The instrument used was a metacognitive ability test given to the experimental class after mathematics learning was completed, using a functional whiteboard. The data collection method used is a test approach. The data analysis techniques used include the use of the difference between two means test and the n-gain test to assess the amount of growth. These findings show a significant increase in the metacognitive abilities of students who were taught using a functional whiteboard, compared to those who were taught without using a functional whiteboard.

INTRODUCTION

Increasing intellectual capacity and forming the moral and cultural values of a nation are the main goals of national education, with the ultimate goal being the development of students

into humans who believe in God, have faith in Him, have noble character, and know a lot about the world, and have physical knowledge. being healthy, creative, capable, independent and constructive has an impact on society as responsible and democratic citizens (Hermanto, 2020). Throughout the entire school process, learning is a necessary activity. The realization of educational goals really depends on how the learning process is carried out.

Fostering students' potential and equipping them to effectively use the knowledge they have acquired both in facing current and future difficulties is what is meant by education that encourages progress in the future (Anastasya and Dewi, 2021). As an important scientific subject, mathematics is used to solve real-world problems in everyday life and in the field of education. Teachers must support students' creativity and competence while coordinates his or her teaching strategies with the content and perspectives of his or her students to achieve effective and successful learning. Math teachers need to understand that every student is different and not all students find the subject enjoyable.

Because mathematics is not an isolated field of study but rather helps in solving other problems faced by humans, including social, economic and natural problems, mathematics is one of the efforts made to advance the fundamental understanding of other sciences in the advancement of science. science and technology (Susanti & Sholihah, 2021). By using learning media, technology will help teachers convey material or concepts more easily. Students will gain appropriate learning experiences through the use of relevant media, thereby enabling them to broaden their conceptual understanding. Students will gain more experience the more real the media used. High level thinking skills are required of students according to the 2013 curriculum. Metacognition is one of the terms used to describe High Level Thinking Skills. In order to help students acquire metacognitive thinking skills, the Ministry of Education and Culture has included this in the formulation of graduate competency requirements (Suryapuspitarini, et al., 2018). According to Preisseisen (in Puspitasari, 2019), metacognition encompasses four distinct skill sets: (1) problem-solving skills; (2) decision-making skills; (3) critical thinking skills; and (4) creative abilities. Capacity Thinking ability (original thought).

According to Flavell in Hendarwati (2017), metacognition should thrive in good schools because there will be a lot of self-awareness learning. Children in school are often given the opportunity to observe and control their cognitive functions. They also gain a lot of experience with metacognition and have the opportunity to learn metacognitive information about tasks, tactics, and themselves. According to Flavel, metacognition is related to: (1). A person's cognitive processes or anything related to him, such as awareness of facts or related data rules, is referred to as his knowledge or awareness (2). To solve a problem, active monitoring is carried out followed by control (also called self-regulation or control) of programs related to objects or cognitive data.

Eliyantika et al. (2022) state that teachers must be skilled in the use of learning media in order to successfully communicate educational messages and information to pupils. Using instructional material is a crucial part of the teaching and learning process. Learning media can be given to students in the form of tools, people, or instructional resources. Additionally, students can improve their ability to communicate with other students by using instructional media.

According to Gultom (2017), conventional learning still dominates mathematics education in Indonesia. Teachers are positioned as people who have information, while students are

seen as objects and are considered to know nothing. Instructors are the ultimate authority and they teach and patronize. Substances and materials taught separately are too emphasized. Mathematics learning resources are offered in complete form. It has been proven that doing this will not help students understand what they are learning.

As a result, many students feel afraid of mathematics lessons or are simply bored with these lessons. If there is no improvement in classroom teaching, this will continue to happen. Muhammad and Nurdiansyah (2014) stated that students have difficulty in solving mathematical problems and providing mathematical arguments because: 1) they do not understand or apply mathematical rules or principles correctly and precisely; 2) do not have a strong understanding of the previous material; 3) cannot solve problems using logical procedures or steps, so that the solutions they produce are in accordance with what they think, whatever steps they take; and 4) do not often control or pay attention to the answers they get.

The metacognitive aptitude category includes these four items. In other words, students' metacognitive abilities are still low. According to O'Neil & Brown, metacognitive skills as defined by Putri & Tayeb (2017) are the ability to think critically to develop problem solving solutions. In contrast, metacognitive knowledge, according to Anderson and Krathwohl (in Sholihah, 2016), is information related to cognition which is usually synonymous with awareness and familiarity with one's own cognition. Thus, awareness of what is known and unknown can be interpreted as metacognition.

Ausebel (in Rosmala, 2021) asserts that the most crucial element of the teaching and learning process that can enhance students' metacognition is their first understanding of the subject they have studied. One way to impart material is through the usage of learning media. According to Suwarno (2016), learning media for mathematics is referred to as a tool to support students' mathematical learning. Students can use props to help them become more creative and experienced learners. In addition to watching the teacher present the content, students can use these props creatively or even create their own. Props come in a variety of forms, including working panels.

One of the media for teaching mathematics to middle school students in eighth grade is the function board, which provides abstract examples of relationships and functions. Students can utilize and create teaching materials directly based on the content they have studied. The author plans to conduct research to describe the increase in metacognitive abilities of students who receive learning using a function board and students who receive learning without using a function board.

METHOD

Two groups or classes—the experimental class and the control class—are selected at random for this study's experimental research design. Pre-test-post-test control group design, or just pre-test-post-test control group design, is the name given to this research design. Students from SMP Negeri 1 Sumedang's class VIII high school participated in this study. In the meantime, the research sample was chosen at random in the classroom. The experimental group, class VIII F, comprising 41 pupils, and the control group, class VIII G, comprising 36 kids, were then assigned. In this study, the experimental class completed a metacognitive ability exam at the conclusion of their math class while using a functioning whiteboard as the research instrument. The technique utilized for gathering data is called the testing

procedure. Data analysis methods used to find the rise include the n-gain test and the difference between two means test.

RESULTS AND DISCUSSION

Results

This research was conducted to find out how much improvement students' metacognitive skills had when they studied with a function board and how much improvement it had when they studied without a function board. Two classes were chosen for this research, namely the experimental class which used a function board to facilitate learning, and the control class which did not use a function board to facilitate learning.

a. Pretest Data Normality Test

The Shapiro Wilk test was used to determine the data normalcy because there were more than 30 pieces of data with a 5% significance level.

Table 1 Results of Test of Normality Data Pretest

Class		Shapiro Wilk Statistic	df	Sig.
Skor	Eksperimen	0,646	41	0,000
	Control	0,906	36	0,005

The experimental class and control class have significance or probability values for the Shapiro-Wilk test of 0.000 and 0.005, respectively. The experimental class and control class sample data are not normally distributed, as demonstrated by the Shapiro-Wilk test, and the H rejection criterion is 0. Because the two samples were not normally distributed, the homogeneity test was not performed. Next, the degree of similarity between the two means was evaluated using the nonparametric Mann-Whitney statistical test.

b. Uji Mann-Whitney Pretest

A non-parametric statistical test using the Mann Whitney test was employed to determine whether or not the pupils in the experimental class and the control class had the same starting metacognitive abilities.

Table 2 Mann-Whitney Test Output Pretest Data Ranks

Class		N	Mean Rank	Sum of Ranks
Score	Eksperimen	41	35,44	1453,00
	Control	36	43,06	1550,00
	Total	77		

Test Statistics[a]

	Score
Mann-Whitney U	592.000
Wilcoxon W	1.453E3
Z	-1.520
Asymp. Sig. (2-tailed)	.128

a. Grouping Variable: CLASS

A two-sided significance value of 0.128 was discovered. Given that the average range for the experimental class is 35.44 and the control class's average range is 43.06, and that the value is greater than 0.05, the testing criteria accept H0, indicating that there is no difference between the average ranges for the experimental and control classes' pretest scores.

c. Posttest Data Normality Test

The purpose of this test is to ascertain whether or not each data set originates from a population that is regularly dispersed. For this analysis, the Shapiro-Wilk test was performed at a significance level of 5%.

Tabel 3 Hasil Test of Normality Data Posttest

Class		Shapiro Wilk Statistic	df	Sig.
Skor	Eksperimen	0, 963	41	.203
	Control	0, 930	36	.025

The significance values for the experimental class and control class were 0.203 and 0.025, respectively. The significance value for the experimental class is higher than 0.05, whereas the control class is lower than 0.05. These criteria show that one of the classes has a significance value less than 0.05, indicating that the sample is not normally distributed. Since the sample is not normally distributed, the next step is the non-parametric Mann-Whitney statistical test.

d. Mann-Whitney Posttest (One Party Test)

To find out if students in the experimental and control groups improved their metacognitive abilities, non-parametric statistical tests utilizing the Mann-Whitney test were employed.

Table 4. Mann-Whitney Test Output Pretest Data Ranks

Class		N	Mean Rank	Sum of Ranks
Skor	Eksperimen	41	48.50	1988.50
	Control	36	28.18	1014.50
	Total	77		

Test Statistics[a]

	POSTTEST
Mann-Whitney U	348.500
Wilcoxon W	1014.500
Z	-3.982
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: CLASS

Given your two-sided significance value is 0.000, 0.000/2 = 0.000. Because this number is less than 0.05, H0 is rejected according to the decision criteria. Therefore, students who receive instruction using a functional whiteboard will see improvements in their metacognitive skills compared to those who do not receive such instruction.

e. Uji N-Gain

The next stage is to compare the quality of metacognitive skills between students who get instruction using a function board and students who do not receive instruction using a function board by analyzing the normalized gain score data.

Table 5. Descriptive Statistics of Normalized Gain Scores for Experiment Class and Control Class

	n	minimum	maximum	mean	std. deviation	variance
Class eksperimen	41	.11	1.00	.6828	.21430	.046
Class Control	36	-.01	.90	.3976	.26860	.072
valid n (listwise)	77					

It is established that the experimental class's normalized gain value has an average (mean) of 0.6828 and the control class's average (mean) is 0.3976. According to the previously specified normalized gain criterion, the experimental class surpassed the control class in metacognitive abilities in the medium category; however, the average (average) normalized gain of the experimental class is higher.

Discussion

Pre-test data analysis revealed that the sample data was not regularly distributed, which was based on the previously described data processing results. As a result, the Mann-Whitney test was substituted with a homogeneity test. The Mann-Whitney test findings using the

SPSS version 16.0 software for Windows indicate that there is no difference between the experimental class and the control class in the pretest; the value is 0.128, which is higher than 0.05. Following pre-test data processing comes post-test data processing. The results of the normality test indicate that the sample is not normally distributed, hence the non-parametric Mann-Whitney statistical test (one-sided test) with a value of 0.000 is the next step. This indicates that, in comparison to students who did not receive learning using a function board, students who received learning using a function board had a higher gain in metacognitive skills. To determine the extent to which students got treatment, data analysis was done on the quality of change in their metacognitive skills. The findings demonstrated that there was an increase in both the experimental and control groups. enhancing the metacognitive skills of the middle class

CONCLUSION

Based on data analysis and discussion of all research stages conducted in class VIII of SMP Negeri 1 Sumedang, it is possible to draw conclusions about learning mathematics with a function board. These conclusions include students who learn better with a function board and students who learn better without one, as well as an increase in group metacognitive skills.

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REFERENCES

Anatasya, E., & Dewi, D. A. (2021). Mata Pelajaran Pendidikan Kewarganegaraan Sebagai Pendidikan Karakter Peserta Didik Sekolah Dasar. *Jurnal Pendidikan Kewarganegaraan Undiksha*, *9*(2), 291-304.

Eliyantika, E., Witono, A. H., & Jiwandono, I. S. (2022). Penggunaan media pembelajaran guru Class IV SDN Kemiri tahun pelajaran 2021/2022. *Jurnal Ilmiah Profesi Pendidikan*, *7*(3), 1315-1326.

Gultom, S. P. (2017). Analisis perbedaan kemampuan berpikir kreatif dan pemecahan masalah matematika antara siswa yang diberi pembelajaran open-ended dengan pembelajaran konvensional. *Jurnal Suluh Pendidikan FKIP UHN*, *4*(2), 100-111.

Muhammad, M., & Nurdyansyah, N. (2015). Pendekatan pembelajaran saintifik.

Hendarwati, E. (2017). Pemanfaatan media permainan sebagai upaya meningkatan metakognitif anak usia dini. *Pedagogi: Jurnal Anak Usia Dini dan Pendidikan Anak Usia Dini*, *3*(3b).

Hermanto, B. (2020). Perekayasaan sistem pendidikan nasional untuk mencerdaskan kehidupan bangsa. *Foundasia*, *11*(2).

Sholihah, U. (2016). Membangun metakognisi siswa dalam memecahkan masalah matematika. *Ta'allum: Jurnal Pendidikan Islam*, *4*(1), 83-100.

Suryapuspitarini, B. K., Wardono, W., & Kartono, K. (2018, February). Analisis soal-soal matematika tipe Higher Order Thinking Skill (HOTS) pada kurikulum 2013 untuk mendukung kemampuan literasi siswa. In *PRISMA, Prosiding Seminar Nasional Matematika* (Vol. 1, pp. 876-884).

Susanti, E. D., & Sholihah, U. (2021). Pengembangan e-modul berbasis flip pdf corporate pada materi luas dan volume bola. *RANGE: Jurnal Pendidikan Matematika*, *3*(1), 37-46.

Suwarno, S. (2016). Meningkatkan Hasil Belajar Siswa Class Vi Sd Negeri 22 Kepahiang Dalam Menentukan Volume Bangun Ruang Melalui Penggunaan Alat Praga Kubus Satuan. *Jurnal PGSD: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, *9*(2), 267-276.

Puspitasari, I. (2019). Penerapan Metakognitif Dalam Media Pembelajaran. *Jurnal Tadarus (Jurnal Pendidikan Islam)*, *8*(1), 72-81.

Putri, A. P., & Tayeb, T. (2017). Kemampuan Metakognisi untuk Meningkatkan Keterampilan Pemecahan Masalah Matematika Siswa Class VIII B MTs Madani Alauddin Paopao Kabupaten Gowa. *MaPan: Jurnal Matematika Dan Pembelajaran*, *5*(1), 1-17.

Rosmala, A. (2021). *Model-model pembelajaran matematika*. Bumi Aksara.