DIFFERENCES IN STUDENTS' MATHEMATICS LEARNING RESULTS AND MOTIVATION USING THE MONTESSORI METHOD AND THE CONVENTIONAL METHOD

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Abstract

This study aims to: (1) determine the differences in students' mathematics learning outcomes between using the Montessori method and using the conventional method;(2) determine the differences in students' mathematics learning motivation between using the Montessori method and the conventional method. This study is a quantitative experimental study, with a pretest-posttest control group design. The population in this study were students of class III MI Al-Ikhsan, with a total of 46 students. Meanwhile, the determination of the sample in this study used a saturated sample, which means that the samples used in the study were all members of the population. The study was conducted in April-May 2024. The data collection process in this study used tests and questionnaires. The data analysis techniques used were normality tests, homogeneity tests, and independent sample t-tests using SPSS. The results of this study are: (1) based on the results of the Independent Sample t-test of learning outcomes, the Sig. (2-tailed) value is (0.001 <0.05), this means that there are differences in the mathematics learning outcomes of students of class III MI Al-Ikhsan who use the Montessori method and students who use the conventional method; (2) Based on the results of the independent sample t-test for learning motivation, the Sig.(2-tailed) value is (0.000<0.05), this means that there is a difference in the motivation to learn mathematics between class III students at MI Al-Ikhsan who use the Montessori method and students who use the conventional method.

Keywords : *montessori method, mathematics learning outcomes, motivation to learn mathematics*

A. Instroduction

In the context of primary education in Indonesia, conventional teaching methods remain the dominant approach employed by teachers in mathematics instruction. A study conducted by Ahmad (2021) revealed that the majority of elementary school teachers still rely heavily on lectures and drill-based exercises as the principal means of teaching mathematics. Consequently, the learning outcomes achieved through such traditional approaches tend to emphasize rote

memorization, with limited development of deep conceptual understanding or real-world application of mathematical concepts.

The instructional methods adopted by educators significantly influence both student learning outcomes and motivation. In educational interactions, beyond having effective strategies suited to students' conditions, teachers must also adopt methods aligned with students' capacities. Without appropriate method selection, teachers may encounter difficulty in achieving instructional goals (Sahabuddin et al., 2022). Furthermore, suitable pedagogical approaches can assist students in better comprehending mathematical concepts and enhancing their confidence in solving mathematical problems (Bella et al., 2019). Therefore, it is essential for educators to explore and evaluate instructional methodologies that are appropriate for the characteristics of their students, to foster optimal academic achievement and improve students' learning motivation.

Under the Merdeka Curriculum, teachers are expected to tailor instruction to students' individual characteristics, thereby enabling learners to explore and develop their capabilities to their fullest potential (Kemendikbud, 2023). This aligns with Montessori's belief that when children are granted the freedom to explore knowledge, their interest will naturally flourish (Montessori, 2022). Ramful et al. (2013) also argued that students' interest in mathematics can be positively influenced by a supportive learning environment, particularly when students are provided opportunities to interact with mathematical concepts in creative and engaging ways, which fosters an increased enthusiasm for the subject.

The Montessori Method has garnered significant attention in the context of mathematics education. This method emphasizes student-centered learning, allowing learners to independently explore mathematical concepts through the use of specially designed materials and tools (Montessori, 2022). Originally developed by Maria Montessori in 1907 at a school for children aged 3 to 6 in Italy, the method emphasizes hands-on, experiential learning. In the translated edition Montessori: A Modern Approach, it is noted that Montessori visited the United States in 1912 to give lectures and share her philosophy. According to Hughes (as cited in Vasandani, 2022), the Montessori Method activates key regions of the brain, contributing to students' enjoyment and success in both school and home settings. The approach also fosters the development of critical thinking, problem-solving abilities, and intrinsic motivation (Lillard, 2013). Rathunde and Csikszentmihalyi (2005) stated that the Montessori Method supports differentiated learning and allows students to learn at their own pace.

Over time, numerous studies have examined the effectiveness of the Montessori Method. Yani (2017) found a significant impact of Montessori-based instruction using teaching aids on student learning outcomes. Zaidi (2020) concluded that the Montessori Method enhances elementary students' understanding of mathematical concepts. Similarly, Hidayat et al. (2020) reported that Montessori-based instruction positively influences students'

motivation to learn mathematics. However, while many studies have investigated the influence of the Montessori Method on student achievement, relatively few have focused on its impact on students' motivation to learn mathematics, particularly in elementary schools, and fewer still have compared the method directly with other instructional strategies.

This research aims to compare mathematics learning outcomes and learning motivation among third-grade students at MI Al-Ikhsan Banyuwangi, using both the Montessori and conventional methods. The term "conventional method" in this study refers to traditional teaching practices that have long been employed (Helmiati, 2012), where the teacher holds the primary role in determining the content and sequencing of material delivery. According to Januari (2017), the conventional method offers several advantages, including efficiency, cost-effectiveness due to minimal use of teaching materials, and its alignment with students' existing conditions.

B. Research Method

This study employed a quantitative experimental approach using the pretest–posttest control group design. The research was conducted at MI Al-Ikhsan Banyuwangi during April–May 2024. The population consisted of all third-grade students at MI Al-Ikhsan, totaling 46 students. The sampling technique used was saturated sampling, meaning all members of the population were included as research subjects.

Data collection involved two primary instruments: tests and questionnaires. Prior to implementation, both instruments underwent validity and reliability testing. The data in this study were collected using test techniques. The data analysis techniques applied included the normality test, homogeneity test, and independent sample t-test, conducted using SPSS software.

C. Result and Discussion

Learning outcomes refer to the new competencies acquired by students as a result of instruction, which may encompass cognitive, affective, or psychomotor domains. In this study, the focus was on cognitive learning outcomes in mathematics, measured through a competency-based multiple-choice test. The assessment focused on the following indicators: (1) Understanding of mathematical concepts; (2) Problem-solving abilities in mathematics; (3) Application of mathematical concepts to daily life ; (4) Ability to collaborate in groups to solve mathematical problems.

Prior to its use, the test instrument was validated using the Pearson Product-Moment correlation. Out of 15 test items, five items (numbers 2, 7, 8, 14, and 15) were excluded due to low validity, leaving ten valid items. The reliability test showed a Cronbach's alpha of 0.406, exceeding the threshold of 0.06, indicating the instrument was reliable.Motivation in learning is defined as an internal or external factor that energizes individuals to achieve particular goals.

In this study, the focus was on intrinsic motivation to learn mathematics. It was measured using a structured questionnaire based on the following indicators:(1) the desire and intention to succeed; (2) the presence of learning drives and needs; (3) aspirations and future goals; (4) recognition and appreciation in learning; (5) engagement in interesting learning activities; (6) A supportive and comfortable learning environment

The questionnaire items were tested using the Pearson Product-Moment, and all items were deemed valid. The reliability test yielded a Cronbach's alpha of 0.389, which also exceeded the acceptable threshold, confirming the instrument's reliability.

Differences in Mathematics Learning Outcomes Between the Montessori and Conventional Methods. A hypothesis test was conducted to determine whether there was a significant difference in learning outcomes between students taught using the Montessori method and those taught using conventional methods. The average pretest score in the experimental group (Montessori method) was 76.55 (n = 29), while the control group scored 68.40 (n = 25). The pretest analysis yielded a Sig. value of 0.357, indicating no significant difference between the groups prior to the intervention.

For the posttest, the experimental group achieved an average score of 87.93, while the control group averaged 76.00. The independent sample t-test showed a mean difference of 11.93 with a Sig. (2-tailed) value of 0.001, which is less than 0.05. This result indicates a statistically significant difference in mathematics learning outcomes between the two groups. Thus, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) accepted.

These findings align with previous research by Wahyuningtiyas (2011) and Asrinan & Dollo (2020), both of which reported significant differences in learning outcomes favoring students taught with the Montessori method. The results are also consistent with Hughes' view (in Vasandani, 2022) that the Montessori method enhances cognitive function, leading to improved performance and satisfaction in both school and home environments.

Differences in Mathematics Learning Motivation Between the Montessori and Conventional Methods. The second hypothesis test examined whether there was a difference in motivation to learn mathematics between the two groups. The average pretest score for motivation in the experimental group was 76.55, while the control group scored 68.40. The Sig. value of 0.945 indicated no significant initial difference.

The posttest results showed an average motivation score of 87.76 in the experimental group and 76.64 in the control group. The mean difference was 9.12, and the Sig. (2-tailed) value was 0.000, which is less than 0.05, indicating a statistically significant difference. Therefore, the null hypothesis was rejected, and it was concluded that students taught using the Montessori method exhibited significantly higher motivation to learn mathematics.

This result is in line with findings by Silaban (2017) and Hidayat et al. (2020), who demonstrated that the Montessori approach effectively enhances students' motivation. These results are further supported by Lillard (2012), who stated that the Montessori method promotes creativity and problem-solving, which in turn stimulates students' curiosity and interest in mathematics.

D. Conclusion

Based on the data analysis and research findings regarding the application of the Montessori method and the conventional teaching method in mathematics instruction, specifically on the topic of fractions, the following conclusions can be drawn: (1) The results of the independent sample t-test for learning outcomes indicated a mean difference in posttest scores of 11.93, with a Sig. (2-tailed) value of 0.001, which is less than 0.05. This signifies a statistically significant difference in mathematics learning outcomes between third-grade students at MI Al-Ikhsan who were taught using the Montessori method and those taught using the conventional method; (2) The results of the independent sample t-test for learning motivation indicated a mean difference in posttest scores of 9.12, with a Sig. (2-tailed) value of 0.000, also less than 0.05. This confirms a significant difference in mathematics learning motivation between third-grade students at MI Al-Ikhsan taught using the Montessori method and those taught using the conventional method. These findings underscore the effectiveness of the Montessori method in enhancing both learning outcomes and motivation in mathematics, suggesting that it serves as a viable alternative to conventional teaching methods in elementary education.

References

Bella, Y., Suhendri, H., & Ningsih, R. (2019). Peranan metode pembelajaran the power of two terhadap kemampuan pemecahan masalah matematika. Jurnal Mercumatika: Jurnal Penelitian Matematika Dan Pendidikan Matematika, 3(2), 129-135.

Helmiati.2012. Model Pembelajaran. Yogyakarta. Aswaja Pressindo.

Hidayat, M. R, Sofyan, A, & Utama, A. H.2020. Pemanfaatan media Montessori dalam meningkatkan motivasi belajar mata pelajaran matematika siswa kelas ii sd. J-INSTECH. 1.(2). 138-145.

Kemendikbudristek. (2023). Kemendikbudristek dorong optimalisasi Kurikulum Merdeka di satuan pendidikan. Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia.

Lillard, A. S.2013. Playful learning and Montessori education. American Journal of play. 6. (3). 359-372.

Ramful, A., Lowrie, T., & Logan, T. (2013). The development of a framework for measuring students' affective engagement with mathematics. ZDM – The International Journal on Mathematics Education, 45(4), 433–444

Rathunde, K., & Csikszentmihalyi, M. (2005). Middle school students' motivation and quality of experience: A comparison of Montessori and traditional school environments. American Journal of Education, 111(3), 341–371.

Sahabuddin, E. S., Syawaluddin, A., & Rahayu, S. (2022). Pengembangan Media Monopoli pada Mata Pelajaran IPA Kelas IV UPT SPF SD Negeri Sudirman III Kota Makassar. Global Journal Basic Education, 1(3), 219-246.

Tamara, R.2021. A-Z Tanya Jawab Montessori & Parenting. 2. Sleman. Bentang Pustaka.

Terjemahan Oleh R. Indardini.2022. The Montessori Baby. 5. Sleman. Bentang Pustaka.

Vasandani, V. (2022). Psikologi pendidikan: Teori dan aplikasinya dalam proses pembelajaran.

Yani, S. 2017. Pengaruh penggunaan metode Montessori dengan menggunakan alat peraga untuk meningkatkan hasil belajar siswa pada materi hukum archimedes di smpn 2 samatiga. Disertasi. Aceh. UIN Salatiga.

Yulianti P, Agus I, Hastini L. 2019. Evaluasi indikator prestasi belajar mahasiswa universitas dharma andalas padang. Jurnal Menara Ilmu. 1. (13). 117.

Zahidi, A. 2020. Analisis metode Montessori pada pembelajaran matematika bagi siswa usia dasar (JENJANG MI/SD). PGMI STTI Al-Ittihadiyah Labuhanbatu Utara. 1. (4). 245-60.