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THE EFFECTIVENESS OF THE ADDIE LEARNING MODEL WITH THE ASSISTANCE OF FLAT SHAPE MINIATURE MEDIA ON THE MATHEMATICS LEARNING ACHIEVEMENT OF GRADE V STUDENTS

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Abstract

The development of science and technology that is not matched by the facilities, infrastructure and skills of teachers in teaching school mathematics achievement resulted in the fifth grade students from year to year. Although this has been done to improve this problem, it has not been able to overcome it. So do other solutions by using the ADDIE model of media-assisted miniature flat wake. The problem is, is there a difference in learning achievement using the ADDIE model of media-assisted miniature flat wake with school performance using the conventional model? The study design was a pretest-posttest control group design. The instruments used are achievement tests and observation sheets student learning activities. The data analysis technique used in this study was a preliminary analysis using normality test and test for equality of two averages and final analysis using normality test and t-test. The result is that the initial analysis of both normal samples and the average are the same. While the final analysis both normal samples t-test and expressed taccount = 4.036> = 2.025 ttable so no difference in average mathematics achievement who received instruction using the ADDIE model of media-assisted miniature flat wake with the conventional model.

Keywords: : ADDIE model of media-assisted miniature flat wake, mathematics achievement, teaching materials identifying properties of flat wake

INTRODUCTION

Learning is a complex process involving various interrelated aspects. A skilled teacher must be able to create a learning process that can lead students to innovative and meaningful learning. However, the reality in the field shows that most teachers have not optimized their teaching skills during learning (Vivien Pitriani, Wahyuni, & Gunawan, 2021). Teachers tend to still use old methods as their teaching supplies. Furthermore, the development of science and technology is also caused by the unbalanced facilities, infrastructure, and resources available in schools to support student learning achievement. As a result, this impacts student learning achievement (Rustandi, 2021).

According to the principal of Karangtowo State Elementary School (Tjahyadi, Ramadhan, Trisetyarso, Abdurachman, & Zarlis, 2023) students' less than optimal learning achievement is in mathematics learning. Even though mathematics lessons are included in the national exam category. And according to the National Education Standards Agency (Fayuan Mai, Jiajue Sun, Qiongyu Tan, 2024) with mathematical knowledge, the nation's future generations will be able to create and master technology in the future. So that understanding of mathematical material must be conceptualized in students from an early age, starting from elementary school to equip students with the ability to think logically, analytically, systematically, critically, and creatively, as well as

the ability to collaborate. These competencies are needed so that students can have the ability to obtain, manage, and utilize information to survive in conditions that are always changing, uncertain, and competitive (He, 2024).

Based on these problems, this study presents the ADDIE model assisted by miniature plane figures media to overcome the problem of declining mathematics learning achievement (Azura & Sihombing, 2017). With the ADDIE model, it is expected that a teacher will be able to analyze all student characteristics and then design learning that is appropriate to the characteristics of students and be able to develop appropriate media and teaching materials and then apply them to existing learning and provide appropriate evaluations to measure the level of student success in learning (Widyastuti & Susiana, 2019). Miniature plane figures media is a media in the form of a miniature and in it there are various forms of plane figures in a puzzle arrangement, where in arranging the puzzle, students must arrange the rhymes on the cartoon (rhyme cards) about the properties of plane figures and the names of the appropriate plane figure (Pranata, Lyesmaya, & Maula, 2024). Miniature flat shape media is a media in the form of a miniature picture resulting from a series of flat shape puzzles and in it there is a series of rhymes whose contents are about the material being taught, where the cartoon (rhyme card) consists of a sampiran cartoon containing the properties of flat shapes and the content cartoon contains the name of the flat shape that matches the properties of the flat shape in the sampiran cartoon (Syahid, Istiqomah, & Azwary, 2024). So that students are able to remember the material without pressure and they learn in a fun and meaningful way (Bernard, Nurmala, Mariam, & Rustyani, 2018). This game can increase children's intelligence. This is in accordance with the opinion of Pribadi (Cahyadi, 2019) that "visual-spatial intelligence is closely related to a person's ability to understand something through the sense of sight and visualize objects." Thus, it is hoped that their learning achievements will also increase (Muñoz, Letechi, & Zamora, 2024).

Research that is relevant to this research has also been conducted by Nurtyaningsari, Avis (García, Ruby, Galeana-Victoria, Flores-Azcanio, & Elizabeth, 2023) in her thesis entitled "Application of ADDIE Learning Model to Improve Activities and Social Studies Learning Outcomes of Grade IV A Students of SD N Pendem 02, Junrejo District, Batu City". In the thesis, it was concluded that the use of the ADDIE model in social studies learning can improve student learning outcomes. This can be seen in the results of the study which showed that the increase in the average value of student learning outcomes before being given action was 58 and at the end of cycle II increased by 80.86. So the results of previous research can be used as a theoretical basis for this research (Elisa et al., 2022).

Therefore, based on relevant theories and the results of previous research, this research is also expected to improve mathematics learning achievement at Karangtowo State Elementary School, Karang Tengah District, Demak Regency.

METHOD

This research is in the form of an experiment. This research was conducted at Karangtowo State Elementary School located at Jalan Raya Semarang-Demak Km. 15 Karangtowo, Karang Tengah, Demak 59561. Karangtowo State Elementary School is precisely located in Karangtowo

Village, Karang Tengah District, Demak Regency (Arizen & Suhartini, 2020). The population in this study were fifth grade students of Karangtowo State Elementary School, Karang Tengah District, Demak Regency, which consisted of 2 (two) classes, namely class VA consisting of 30 students and class VB consisting of 30 students. Because the population used in this study was less than 100 students, the sample in this study was the same as the population studied, namely fifth grade students of Karangtowo State Elementary School, Karang Tengah District, Demak Regency, which consisted of 2 (two) classes, namely class VA consisting of 30 students and class VB consisting of 30 students. The sampling technique used in this study was *non* -probability *sampling* with a saturated sampling type (Andriyani & Suniasih, 2021).

The instruments used in this study were a multiple-choice achievement test with 30 questions and an observation and documentation sheet (Sari, Hidayah, & Najibufahmi, 2021). The observation and documentation sheets were used to determine the learning process using the ADDIE model with the aid of miniature plane figures and to determine student activities during the learning process (Otoluwa, Eraku, & Yusuf, 2019).

The research design used was *a True Experimental Design* with a *Pretest-posttest control group design.* According to Sugiyono (Berlian, Arsad, Hardila, Yovita, & Nasution, 2024), the pattern of *the Pretest-posttest control group design* is as follows:

E	O_1	X	O_2
K	O_3	X	O_4

Figure 1. Pretest-posttest control group design

Information:

O_1 = *Pretest* in experimental class
O_2 = *Posttest* in the experimental class
O_3 = *Pretest* in control class
O_4 = *Posttest* in control class
E = Experimental class
K = Control class

In this design, there are two groups with the same abilities, then given *a pretest* to determine the initial conditions whether there is a difference between the control class and the experimental class (Bintang, 2021). The *pretest results* are good if the experimental group's scores are not significantly different (Friendha Yuanta & Diyas Age Larasati, 2023). Next, the experimental class is given treatment using the ADDIE learning model assisted by miniature plane building media and the control group is not given treatment, but only uses conventional learning. The *posttest results are good if the experimental group's scores are very significantly different. The effect* of the treatment is $(O2_{-01}) - (O4_{-03})$ (Eliyah, Isnani, & Utami, 2018).

The data analysis technique in this study uses an initial analysis using a normality test and a test of equality of two means (Niyah, Nursit, & Zauri, 2022). Where the normality test and the test of equality of two means are used to determine the condition of the two samples coming from a population that is normally distributed or not and has the same initial average or not. In learning, the experimental group was given treatment using the ADDIE learning model assisted by miniature flat shape media. While the control group was given treatment using a conventional model (expository) (Waruwu, Harefa, Telaumbanua, & Zega, 2024). The final analysis uses a normality test and a two-tailed test (t-test). Where the normality test and the two-tailed test (t-test) at the end are to determine whether the two samples are still normally distributed and have differences in learning achievement or remain the same as the initial analysis (Suharnita, Armis, & Anggraini, 2021).

RESULTS AND DISCUSSION

Table 1. Mathematics Learning Achievement of Experimental Class and Control Class

Mathematics learning achievement		Class	
		Experiment	Control
Test	Pre-test	69.55	69.30
	Post-test	82.60	70.50

Based on the table above, the test data used were in the form of *a pre-test* and *post-test.* The *pre-test results* of both samples showed that the average score of the experimental class was 69.55 and the average *pre-test score* of the control class was 69.3. This indicates that both samples started in the same condition. Meanwhile, the *post-test results* between the two samples that received mathematics learning, specifically the material on identifying the properties of flat shapes, showed that the average score of the experimental class was 82.6 and the average score of the control class was 70.5.

The results of the study in class V of Karangtowo State Elementary School, especially the material on identifying the properties of flat shapes, showed that the *post-test results* for experimental class students showed that 17 students were able to achieve individual learning mastery and three students had not achieved individual learning mastery. While the learning achievement of control class students, there were nine students who were able to achieve individual mastery from a total of 20 students and 11 students had not been able to achieve individual learning mastery. So based on the results of individual learning mastery, the results of classical learning mastery by each class can be obtained that the experimental class was able to achieve classical learning mastery by 85% and the control class was only able to achieve classical learning mastery by 45%. This shows that the experimental class was able to achieve learning mastery, both individual learning mastery and classical learning mastery (Ratnasari, 2017). While the results of the control class were still below 85% of the classical learning mastery that had been set. So the control class has not been able to be said to be able to achieve individual learning mastery or classical learning mastery.

Based on the results of the calculation of the average value of the experimental group's mathematics learning outcomes, an increase in learning achievement was obtained. Initially, the average mathematics learning achievement of the experimental class was 69.55, then after

improvements were made in this research activity using the ADDIE design model assisted by miniature plane figures media, the average classical learning achievement of the experimental class was 82.6. This shows that there is an increase in learning achievement using the ADDIE learning model assisted by miniature plane figures media on the material of identifying the properties of plane figures (Delisda & Sofyan, 2014).

The results of the initial data calculation obtained from the *pre-test value,* then the normality test of the experimental class (VA) for n = 20 and the real level α = 5% with the *Lilliefors test* obtained the results of L_{table} = 0.19 and L_0 = 0.122, so that the criteria $L_0 < L_{table}$ or 0.122 < 0.19 were obtained. Therefore, it can be concluded that H_0 is accepted. So, the data comes from a normally distributed population. The results of the initial data calculation *pre-test* of the normality test of the control class (VB) for n = 20 and the real level α = 5% with the *Lilliefors test* obtained the results of L_{table} = 0.19 and $L_{0 = 0.117}$, so that the criteria $L_0 < L_{table}$ or 0.117 < 0.19 were obtained. Therefore, it can be concluded that H_0 is accepted. So, the data comes from a normally distributed population. Based on the equality test of the two average initial conditions between the experimental group and the control group, the $t_{calculated}$ = 0.368 with dk = 39 and the real level (1- ½α = 0.975) was obtained, so $t_{(0.975;\ 39)}$ = 2.023. Because the $t_{calculated} < t_{table,}$ then H_0 is accepted, meaning that the average *pre-test score* of students between the experimental group and the control group is the same (Tahir & Marniati, 2018).

The results of the final data calculation obtained from the *post-test value,* then the normality test of the experimental class (VA) for n = 20 and the real level α = 5% with the *Lilliefors test* obtained the results of L_{table} = 0.19 and L_0 = 0.109, so that the criteria $L_0 < L_{table}$ or 0.109 < 0.19 were obtained. Therefore, it can be concluded that H_0 is accepted. So, the data comes from a normally distributed population. The results of the final data calculation of the post-test normality test of the control class (VB) for n = 20 and the real level α = 5% with the *Lilliefors test* obtained the results of L_{table} = 0.19 and $L_{0 = 0.163}$, so that the criteria $L_0 < L_{table}$ or 0.163 < 0.19 were obtained. Therefore, it can be concluded that H_0 is accepted. So, the data comes from a normally distributed population.

From the research it is known that the average of the experimental group $\bar{x}$= 82.6 and the average of the control group $\bar{x}$= 70.5 with $n_1 = n_2 = 20$ obtained t_{count} = 4.036. With α = 5% with dk = 20 + 20 – 2 = 38 obtained $t_{(0.95)\ (38)}$ = 2.025. Because $t_{count} > t_{table}$ then H_0 is rejected and H_1 is accepted meaning there is a difference in the average mathematics learning achievement of students who receive instruction using the ADDIE design model assisted by miniature flat shape media with the average mathematics learning achievement of students who receive instruction using the conventional model (Mariyah, 2022).

Based on the results of statistical analysis, it was concluded that the hypothesis $H0_{was}$ rejected and $H1_{was}$ accepted. Thus, it can be concluded that the hypothesis that the use of the ADDIE design model assisted by miniature plane figures or other media is better than conventional learning can be accepted, meaning that students' mathematics learning achievement on the subject of identifying the properties of plane figures from students in the experimental group is better than the learning achievement of students in the control group. In learning using the ADDIE design model assisted by miniature plane figures is better because it is able to activate students in the teaching and learning process and provides opportunities for students to express their respective

opinions. This can be shown by the results of the assessment of the affective and psychomotor aspects of students in the experimental class stating that 85% of students have affective and psychomotor aspects according to learning objectives (Suharti, Muslim, & Sriyanto, 2020).

The learning achievement of the experimental group using the ADDIE design model assisted by miniature plane figures on the subject of identifying the properties of plane figures is better because usually students are easier to accept the concept of material with games and memories that are formed because of the language of habits and students are able to interact actively with the media or learning resources available. While the control class that was only treated with the conventional model stated that students were less actively involved in learning, students were only recipients of ideas from the teacher without being able to explore their creativity, so that students' abilities could not be trained well. In this study, observation and documentation sheets were also provided so that it was easier to find out the implementation of mathematics learning with the ADDIE model assisted by miniature plane figures. Based on data from the observation sheet, it was found that students felt happier and understood more about the material identifying the properties of plane figures. So it can be said that students tried to develop their thinking by conveying the results of their work according to their group work.

Based on the results of the observation sheet of student learning activities at meetings I, II, III, IV, V, and VI, it can be seen that the most prominent activity is the activity of students in working on group discussions during game activities and interacting with learning media. So the ADDIE model assisted by miniature plane building media is able to explore students' creativity in learning and help students find new solutions in solving a problem. In addition, the ADDIE model assisted by miniature plane building media also invites students to work together and increases the sense of solidarity among each other. So it can be said that the ADDIE model assisted by miniature plane building media is better when compared to the conventional model which only uses lectures and works on worksheets so that students' activeness and abilities cannot be developed optimally. The conventional model which only relies on lectures and worksheets alone is considered less able to attract students' motivation in learning because there is no stimulus that challenges students to solve problems creatively so that the conventional model is considered less good and less able to develop students' abilities (Yunastutik, 2017).

Learning using the ADDIE model assisted by miniature plane figures will be more structured in its learning activities in preparing students when receiving abstract material concepts. Miniature plane figures media that are present are more concrete and provide a real application in manipulating objects in the form of plane figures are expected to make it easy for students to conceptualize the material in everyday life so that students will easily understand and comprehend the material being taught. While learning using conventional models only provides general material and students are asked to work on LKS according to the material. In conventional models there is less interaction between students and teachers or with learning resources. So this causes student learning achievement to experience less improvement. Based on this, it can be said that the use of the ADDIE model assisted by miniature plane figures can improve student learning achievement (Matondang, 2018).

CONCLUSION

Based on the previous discussion, this study can be concluded that with the difference in mathematics learning achievement of fifth grade students of Karangtowo State Elementary School who use the ADDIE model assisted by miniature plane figures media with conventional learning where the ADDIE model assisted by miniature plane figures media is stated to be better for use in mathematics learning, then this study can be used to improve mathematics learning achievement in particular. This is proven in previous research that has also done the same thing as in this study. The ADDIE model assisted by miniature plane figures media is stated to be able to increase students' intelligence and learning motivation in which it is packaged in an interesting and meaningful game. Therefore, this study can improve mathematics learning achievement.

With this research, it is recommended that certain parties pay attention to the following suggestions so that the results are more optimal, namely: Teachers are encouraged to try using the ADDIE design model in other subject areas. This will help them hone their teaching skills and innovate meaningful and enjoyable learning. For school principals, it is hoped that they can provide skills and training to teachers regarding learning models similar to the ADDIE model and the use of

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