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The effect of differentiated learning approach based on learning style on critical thinking skills and mathematical problem solving of junior high school students PAB 5 Patumbak

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ABSTRACT

The objectives of this study are 1) to analyze the influence of differentiated learning approaches based on learning styles on students' critical thinking skills and mathematical problem solving, 2) to analyze significant differences in critical thinking skills between students with different learning styles (e.g. visual, auditory, kinesthetic) after following the differentiated learning approach and 3) to analyze the influence of differentiated learning approaches tailored to students' learning styles on students' mathematical problem-solving abilities. The form of research used by the researcher is *One-group Pretest-Posttest Design*. The sample in this study is all students of grades VII-1, VII-2 and VII-3. Based on the results that have been carried out, it is obtained that 1) there is a significant influence between differentiation learning based on learning styles on the critical thinking ability and mathematical problem solving of students, 2) there is a significant difference in critical thinking skills between students with different learning styles after participating in differentiated learning and 3) there is a significant influence between differentiation learning that is adjusted to the learning style of students to the mathematical problem-solving ability of students.

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INTRODUCTION

The Differentiated Learning Approach is closely related to learning styles. Learning that focuses on building a student's learning chemistry is certainly needed for a learning style that will support the implementation of a differentiated learning approach in the classroom, so that students are able to demonstrate their mathematical abilities when participating in classroom learning. Basically, students have different ways to understand a concept when teaching (Susila & Aryasuari, 2023). There are students who understand concepts only through reading, there are also those who can understand, they must first take notes to understand concepts Farid, (2022). The difference

between students when receiving, compiling and processing information when learning activities are called learning styles. According to Arman, (2020) learning style is the way a person when processing information, thinking, reasoning, and solving problems tends to want teaching in groups and is very dependent on information from teachers.

Critical thinking skills are one of the important competencies that students must have in learning mathematics. Critical thinking allows students to solve problems independently and responsibly by using a variety of solutions (Aulia, 2023). However, it is known that students in Indonesia still tend to be accustomed to memorizing and learning mathematics material without a deep understanding. This problem also occurs at SMP PAB 5 Patumbak, where students can only understand what the teacher explains, when students are given different problems, it is difficult for students to solve the problem (Ruron, 2021).

Critical thinking skills in mathematics include the ability to interpret, analyze, evaluate, infrere, explain, and self-regulate. This is in line with the purpose of mathematics learning contained in Permendikbud Number 58 of 2014, which emphasizes the use of mathematical reasoning and manipulation in solving problems both in the context of mathematics and outside mathematics (Wulandari et al., 2019).

Teachers who use conventional methods tend to focus on delivering material theoretically, so it can make students feel bored and unmotivated to learn. This can affect the effectiveness of learning interventions that are oriented towards increasing student learning motivation.

Conventional methods tend to focus on delivering material theoretically, so it can make students untrained to think critically. This can affect the effectiveness of learning interventions that are oriented towards improving students' critical thinking skills.

The results of PISA 2022 in mathematics show that the quality of mathematics education in Indonesia still needs to be significantly improved. Indonesia's math score dropped from 379 in 2018 to 366 in 2022 (Rezky et al., 2020). If there is no serious effort that is directly to the goal of improving mathematics learning in the classroom, especially in learning the process of reasoning, it is impossible for improvement to occur. Therefore, schools are required to prepare students to have good critical thinking skills so that they can improve the quality of mathematics education in Indonesia (Djong et al., 2021).

According to Gagne in the study (Rusdi et al., 2022), it is said that problem-solving skills are a skill in students to be able to use mathematical activities to solve problems in mathematics, problems in other sciences and problems in daily life. Based on these various opinions, problem-solving skills are needed to train students to get used to facing various problems in their increasingly complex lives, not only in problems in mathematics itself but also problems in other fields of study and problems in daily life. Therefore, a person's ability to solve mathematical problems needs to be continuously trained so that a person is able to solve various problems that he or she faces (Suryani et al., 2020:74).

Based on these goals, it is clear that mathematical problem-solving skills are one of the skills that must be mastered by students at school. Mathematical problem-solving skills are the ability to understand problems, plan problem solving, solve problems and re-check the steps of working on solving the problem (Siswanto & Meiliasari, 2024).

However, what happened in the field was not in accordance with what was expected, students' mathematical problem-solving skills still tended to be low, mathematics learning in schools also still tended to be book-oriented, the presentation of material from the teacher as a whole, the provision of sample questions, then students were asked to work on several problems and closed by discussing them together. This kind of learning is certainly less able to spur and develop students' critical thinking skills and mathematical problem-solving skills (Firdaus et al., 2021).

The problem of students' critical thinking skills in the field also clearly shows that students at school still have low critical thinking skills. This can be seen from the way they complete

assignments and questions given by teachers. Students tend to rely on memory and are not able to analyze and evaluate information properly. In addition, observations also show that teachers still use less effective learning methods in improving students' critical thinking skills. Teachers tend to use lecture methods and do not give students the opportunity to discuss and think critically (Maulidina et al., 2021).

The results of interviews with teachers and students also show that the curriculum currently used is inadequate in improving students' critical thinking skills. Curriculum tends to focus on knowledge and does not provide opportunities for students to develop their critical thinking skills (Prima Riyani & Muhamad Sofian Hadi, 2023). Then the researcher also gave SPLDV questions to students to measure students' critical thinking skills, that many students could not complete SPLDV correctly because they could not use critical thinking skills well. The student also has low critical thinking skills in completing SPLDV. Therefore, efforts need to be made to improve the critical thinking skills of these students (Riam Nurussilmah et al., 2020).

One of the main advantages of the Differentiated Learning Approach with learning styles is its ability to encourage students to be actively involved in solving mathematical problems. Through differentiation juxtaposed with learning styles, students can be faced with challenges that suit their abilities, encouraging them to think critically and apply mathematical concepts in diverse situations. This is in line with the purpose of mathematics learning which is emphasized to train students' problem-solving and mathematical reasoning skills.

RESEARCH METHODOLOGY

The form of research used by the researcher is *One-group Pretest-Posttest Design*. The researcher took the form of this study because there was no comparison class and the researcher only provided an application of a differentiated learning approach. According to Wahyudin, (2017) the design of this study uses *One Group Pretest-Posttest Design* from *Pre-Experimental Design*. This means that in this design there is a pretest, before being given a treatment. Thus, the results of treatment can be known more accurately, because they can be compared with the situation before being given treatment.

This study uses a limited population, namely a population that has a clear data source with clear boundaries quantitatively. The population in this study is all students of grade VII SMP PAB 5 Patumbak for the 2024/2025 school year which totals 94 students consisting of 3 parallel classes, namely VII-1, VII-2 and VII-3. The sample in this study is all students of grades VII-1, VII-2 and VII-3. The selection of the research subject was based on consideration of the learning styles that students liked and were interested in, both visual, auditory, and kinesthetic learning styles (Syugiyono, 2023).

The data analysis technique in a study is carried out after the data is collected and is the peak activity of a research because with the analysis of research data conclusions can be drawn whether it is in accordance with the research objectives or not (Orbitha Khaillasiwi et al., 2020). The data analysis technique in the quantitative research method is called the statistical method, which explains data through numbers (Sutisna, 2020)(Balaka, 2022)(Jailani & Saksitha, 2024). In this study, the data analysis techniques used are homogeneity, manova test, anova test, and multiple linear analysis test (Hasanudin & Nugroho, 2023).

RESULTS AND DISCUSSIONS

Normality Test

Students' Critical Thinking Skills

a. *Pre-test* Data On Students' Critical Thinking Ability in Grade VII-1 (Visual), in the data on students' critical thinking ability before being given a differentiated learning approach based on

learning styles in grade VII-1 after the calculation of the normality test by the researcher was obtained $L_{hitung} = 0{,}0513$ with a value $L_{tabel} = 1{,}61$. Because $L_{hitung} < L_{tabel}$ that is $0{,}0513 < 1{,}61$ Therefore, it can be concluded that the zero hypothesis is accepted, so that the distribution *of pre-test* data on students' critical thinking ability in grade VII-1 before being given a differentiated learning approach based on normal distributed learning styles.

b. *Pre-test* Data on Students' Critical Thinking Ability in Grades VII-2 (Auditory), in the data on students' critical thinking skills before being given a differentiated learning approach based on learning styles in grades VII-2 after the calculation of the normality test by the researcher was obtained. $L_{hitung} = 0{,}138$ with a value $L_{tabel} = 1{,}697$. Because $L_{hitung} < L_{tabel}$ that is $0{,}138 < 1{,}697$ therefore, it can be concluded that the zero hypothesis is accepted, so that the distribution of *pre-test* data on students' critical thinking ability in grades VII-2 before being given a differentiated learning approach based on normal distributed learning styles.

c. *Pre-test* Data on Students' Critical Thinking Ability in Grades VII-3 (Kinesthetic), the *pre-test* data of students' critical thinking ability before being given a differentiated learning approach based on learning style in grades VII-3, the researcher calculated the normality test through Microsoft excel so that the score was obtained $L_{hitung} = 0{,}092$ with a value $L_{tabel} = 1{,}697$. Because $L_{hitung} < L_{tabel}$ that is $0{,}092 < 1{,}697$ Therefore, it can be concluded that the zero hypothesis is accepted, so that the distribution of *pre-test* data on students' critical thinking ability in grades VII-3 before being given a differentiated learning approach based on normal distributed learning styles.

d. *Post-test* Data On Students' Critical Thinking Ability in Grade VII-1 (Visual), p*ost-test* data on students' critical thinking ability after being given a differentiated learning approach based on visual learning styles in grade VII-1, the researcher calculated the normality test through Microsoft excel so that the score was obtained $L_{hitung} = 0{,}061$ with a value $L_{tabel} = 1{,}61$. Because $L_{hitung} < L_{tabel}$ that is $0{,}061 < 1{,}61$ therefore, it can be concluded that the zero hypothesis is accepted, so that the distribution of *post-test* data on students' critical thinking ability in class VII-1 after being given a differentiated learning approach based on normal distributed visual learning styles.

e. *Post-test* Data On Students' Critical Thinking Ability in Grades VII-2 (Auditory), in the *post-test* data, students' critical thinking ability after being given a differentiated learning approach based on auditory learning styles in grades VII-2, the researcher obtained the results of the students' test and then calculated the normality test through Microsoft excel so that the score was obtained. $L_{hitung} = 0{,}107$ with a value $L_{tabel} = 1{,}697$. Because $L_{hitung} < L_{tabel}$ that is $0{,}107 < 1{,}697$ then it can be concluded that the zero hypothesis is accepted, so that the distribution of *post-test* data on students' critical thinking ability in grades VII-2 after being given a differentiated learning approach based on the normal distributed auditory learning style.

f. *Post-test* Data On Students' Critical Thinking Ability in Grades VII-3 (Kinesthetic), in the *post-test* data, students' critical thinking ability after being given a differentiated learning approach based on kinesthetic learning styles in grades VII-3, the researcher obtained the results of the student test and then calculated the normality test through Microsoft excel so that the score was obtained. $L_{hitung} = 0{,}078$ with a value $L_{tabel} = 1{,}697$. Because $L_{hitung} < L_{tabel}$ that is $0{,}078 < 1{,}697$. Therefore, it can be concluded that the zero hypothesis is accepted, so that the distribution of *post-test* data on students' critical thinking ability in grades VII-3 after being given a differentiated learning approach based on a normal distributed kinesthetic learning style.

Students' Mathematical Problem-Solving Abilities

a. *Pre-test* Data On Students' Mathematical Problem-Solving Ability in Grade VII-1 (Visual), in the data on students' mathematical problem-solving ability before being given a differentiated

learning approach based on learning styles in class VII-1 after the calculation of the normality test by the researcher was obtained, a score $L_{hitung} = 0,182$ with a value was obtained $L_{tabel} = 1,61$. Because $L_{hitung} < L_{tabel}$ that is $0,182 < 1,61$ then it can be concluded that the zero hypothesis is accepted, so that the distribution of *pre-test* data students' mathematical problem-solving skills in grade VII-1 before being given a differentiated learning approach based on normal distributed learning styles.

b. *Pre-test* Data On Students' Mathematical Problem-Solving Skills in Grades VII-2 (Auditory), in the data on students' mathematical problem-solving ability before being given a differentiated learning approach based on learning styles in grade VII-2 after the calculation of the normality test by the researcher was obtained. $L_{hitung} = 0,150$ with a value $L_{tabel} = 1,697$. Because $L_{hitung} < L_{tabel}$ that is $0,150 < 1,697$ then it can be concluded that the null hypothesis is accepted, so that the distribution of *pre-test* data students' mathematical problem-solving skills in grades VII-2 before being given a differentiated learning approach based on normal distributed learning styles.

c. *Pre-test* Data On Students' Mathematical Problem-Solving Skills in Grades VII-3 (Kinesthetic), the *pre-test* data on students' mathematical problem-solving abilities Before being given a differentiated learning approach based on learning style in grades VII-3, the researcher calculates the normality test through Microsoft excel so that the score is obtained $L_{hitung} = 0,169$ with a value $L_{tabel} = 1,697$. Because $L_{hitung} < L_{tabel}$ that is $0,169 < 1,697$ then it can be concluded that the zero hypothesis is accepted, so that the distribution of *pre-test* data students' mathematical problem-solving skills in grades VII-3 before being given a differentiated learning approach based on normal distributed learning styles.

d. *Post-test* Data On Students' Mathematical Problem-Solving Skills in Grades VII-1 (Visual), *post-test* data on students' mathematical problem-solving ability After being given a differentiated learning approach based on visual learning styles in grade VII-1, the researcher calculated the normality test through Microsoft excel so that a score $L_{hitung} = 0,120$ with a value was obtained $L_{tabel} = 1,61$. Because $L_{hitung} < L_{tabel}$ that is $0,120 < 1,61$ then it can be concluded that the zero hypothesis is accepted, so that the distribution of *post-test* data on students' mathematical problem-solving ability in grade VII-1 after being given a differentiated learning approach based on normal distributed visual learning styles.

e. *Post-test* Data On Students' Mathematical Problem-Solving Ability in Grades VII-2 (Auditory), In the *post-test* data on students' mathematical problem-solving ability after being given a differentiated learning approach based on auditory learning styles in grades VII-2, the researcher obtained the results of the students' test and then calculated the normality test through Microsoft excel so that the score was obtained $L_{hitung} = 0,170$ with a value $L_{tabel} = 1,697$. Because $L_{hitung} < L_{tabel}$ that is $0,170 < 1,697$ Therefore, it can be concluded that the null hypothesis is accepted, so that the distribution of *post-test* data on students' mathematical problem-solving ability in grades VII-2 after being given a differentiated learning approach based on normal distributed auditory learning styles.

f. *Post-test* Data On Students' Mathematical Problem-Solving Ability in Grades VII-3 (Kinesthetic), in the *post-test* data on students' mathematical problem-solving skills, after being given a differentiated learning approach based on kinesthetic learning styles in grades VII-3, the researcher obtained the results of the students' test and then calculated the normality test through Microsoft excel so that the score was obtained. $L_{hitung} = 0,123$ with a value $L_{tabel} = 1,697$. Because $L_{hitung} < L_{tabel}$ that is $0,123 < 1,697$. Therefore, it can be concluded that the zero hypothesis is accepted, so that the distribution of *post-test* data on students' mathematical problem-solving ability in grades VII-3 after being given a differentiated learning approach based on a normal distributed kinesthetic learning style.

Homogeneity Test
Students' Critical Thinking Skills

a. Students' Critical Thinking Skills in Grades VII-1 (Visual), the *pre-test* and *post-test* data of students that have been obtained by the researcher are then analyzed and calculated the homogeneity level of the data through the Microsoft excel application. Based on the calculations that have been made, the $x^2_{\text{hitung}} = 1{,}172$ with a value $x^2_{\text{tabel}} = 1{,}90$. Because $x^2_{\text{hitung}} < x^2_{\text{tabel}}$ that is $1{,}172 < 1{,}90$. So the data on students' critical thinking skills in grade VII-1 is homogeneous.
b. Students' Critical Thinking Skills in Grades VII-2 (Auditory), the *pre-test* and *post-test* data of students that have been obtained by the researcher are then analyzed and calculated the homogeneity level of the data through the Microsoft excel application. Based on the calculations that have been made, the $x^2_{\text{hitung}} = 1{,}14$ with a value $x^2_{\text{tabel}} = 1{,}90$. Because $x^2_{\text{hitung}} < x^2_{\text{tabel}}$ that is $1{,}14 < 1{,}90$ then the data on students' critical thinking skills in grades VII-2 are homogeneous.
c. Students' Critical Thinking Skills in Grades VII-3 (Kinesthetic), the *pre-test* and *post-test* data of students that have been obtained by the researcher are then analyzed and calculated the homogeneity level of the data through the Microsoft excel application. Based on the calculations that have been made, the $x^2_{\text{hitung}} = 1{,}71$ with a value $x^2_{\text{tabel}} = 1{,}90$. Karena $x^2_{\text{hitung}} < x^2_{\text{tabel}}$ with a value $1{,}71 < 1{,}90$ then the data on students' critical thinking abilities in grades VII-3 is homogeneous.

Students' Mathematical Problem-Solving Abilities

a. Students' Mathematical Problem-Solving Skills in Grades VII-1 (Visual), the *pre-test and post-test data* on students' mathematical problem-solving abilities that have been obtained by the researcher are then analyzed and calculated the level of homogeneity of the data through the Microsoft excel application. Based on the calculations that have been made, the $x^2_{\text{hitung}} = 0{,}29$ with a value $x^2_{\text{tabel}} = 1{,}90$. Because $x^2_{\text{hitung}} < x^2_{\text{tabel}}$ that is $0{,}29 < 1{,}90$ then the data on students' mathematical problem-solving ability in grade VII-1 is homogeneous.
b. Students' Mathematical Problem-Solving Skills in Grades VII-2 (Auditory), the *pre-test and post-test data* on students' mathematical problem-solving abilities that have been obtained by the researcher are then analyzed and calculated the level of homogeneity of the data through the Microsoft excel application. Based on the calculations that have been made, the $x^2_{\text{hitung}} = 1{,}72$ with a value $x^2_{\text{tabel}} = 1{,}90$. Because $x^2_{\text{hitung}} < x^2_{\text{tabel}}$ that is $1{,}72 < 1{,}90$ then the data on students' mathematical problem-solving ability in grades VII-2 is homogeneous.
c. Students' Mathematical Problem-Solving Skills in Grades VII-3 (Kinesthetic), the *pre-test and post-test data* on students' mathematical problem-solving abilities that have been obtained by the researcher are then analyzed and calculated the level of homogeneity of the data through the Microsoft excel application. Based on the calculations that have been made, the $x^2_{\text{hitung}} = 1{,}02$ with a value $x^2_{\text{tabel}} = 1{,}90$. Because $x^2_{\text{hitung}} < x^2_{\text{tabel}}$ that is $1{,}02 < 1{,}90$ then the data on students' mathematical problem-solving abilities in grades VII-3 is homogeneous.

Hypothesis Test
First Hypothesis

The first hypothesis was analyzed through the Manova test. The data analyzed using the manova test are data on students' *pretest* and *posttest* critical thinking skills and *pretest* and *posttest* scores of students' mathematical problem-solving skills. However, before the calculation through the Manova test, a prerequisite test must be carried out, namely the variance-covariance matrix homogeneity test *(Box's M),* with the criteria if the value of $x^2_{\text{count}} < x^2_{\frac{1}{2}(g-1)p(p+1)}$ then the data have the *same dependent covariance*.

Table 5. Variance-covariance matrix homogeneity test results (box's *m)*

M	C_1	C	x^2_{count}	$x^2_{\frac{1}{2}(g-1)p(p+1)}$	Results
4,856	0,036	0,964	4,68	7,815	*Same covarians dependent*

Data processed by Researchers

Based on the table above, it can be seen that the results of the homogeneity test analysis of the variance-covariance matrix *(Box's M)* that is $x^2_{\text{hitung}} = 4{,}68$ and $x^2_{\frac{1}{2}(g-1)p(p+1)} = 7{,}815$. Because $x^2_{\text{hitung}} < x^2_{\frac{1}{2}(g-1)p(p+1)}$ this shows that *the pretest* and *posttest* data of students' critical thinking skills and the *pretest* and *postest* scores of students' mathematical problem-solving abilities have the *same dependent covariance*.

Furthermore, because the data has met the requirements of the Manova test, the Manova test can be carried out. A summary of the manova test results can be seen in the following table.

Table 6. Summary of manova test results

λ	$\sqrt{\lambda}$	F_{count}	F_{table}	Conclusion
0,622	0,7885	15,82	3,15	There is an Influence

Data processed by Researchers

Through the results of the manual calculation in the table above, it can be seen that it has been obtained $F_{hitung} > F_{tabel}$ that is $15{,}82 > 3{,}15$. This shows that $F_{hitung} > F_{tabel}$ Therefore, it can be concluded that there is a significant influence between differentiation learning based on learning styles on critical thinking skills and mathematical problem solving of students of SMP PAB 5 Patumbak.

Second Hypothesis

To test the second hypothesis, the step taken is to analyze with the Anova test. This helps in determining if there are significant differences between the critical thinking abilities of students from different learning style groups. For the results of the Anova test on critical thinking skills between students with learning styles, you can see the table below:

Table 7. Anova test calculation results

Sumber Varians	JK	RJK	F_{count}	F_{table} $\alpha = 0.05$
Antar (B)	3686,63	3686,63		
In the	7476,57	109,95	33,5	3,98
Total	11163,20			

Data processed by researchers

Based on the results of the analysis of the F test contained in the summary of the results of the Anova test, it was obtained $F_{count} = 33{,}5$, known in $F_{table} = 3{,}98$. Next, by comparing F_{hitung} with F_{tabel} to determine the acceptance and rejection criteria H_{02}, it is known that the value of the coefficient $F_{hitung} \geq F_{tabel}$ based on the previous provisions, there is a significant difference in critical thinking skills between students with different learning styles after participating in differentiated learning.

Third Hypothesis

The calculation of the multiple Linear Regression test can be seen in the appendix. For the results of the multiple Linear Regression test on visual, auditory and kinesthetic learning style data

on the mathematical problem-solving ability of students in grade VII-1, it can be seen in the table below.

Table 8. Results of multiple linear regression calculation in class vii-1

Model	B	Std. Error	F	Sig.	F_{tabel}
(Constant)	47.788	2.698	182,765	0,000[b]	3,98
Visual	0,226	.081			
Auditory	0,557	.158			
Kinesthetic	-0,038	.054			

Data processed by Researchers

Based on table 8 it can be seen that the $F_{count} = 182,765$ and $F_{table} = 3,98$. Because the $F_{hitung} > F_{tabel}$ Therefore, it can be obtained that there is a significant influence between differentiated learning that is adjusted to students' learning styles on students' mathematical problem-solving abilities in grade VII-1. Paying attention to the results of the multiple regression analysis, showing the regression equation (*unstandardized coefficients B*) Y = 47,788 + 0,226 (Visual) + 0,557 (Auditory) + (-0,038) (kinesthetic) which means that every one unit of visual learning style data score, auditory learning style data and kinesthetic learning style data together will affect the math problem-solving ability score in class VII-1 by 0,745 (0,226+0,557-0,038).

For the results of the multiple Linear Regression test on visual, auditory and kinesthetic learning style data on the mathematical problem-solving ability of students in grade VII-2, it can be seen in the table below.

Table 9. Results of multiple linear regression calculation in class vii-2

Model	B	Std. Error	F	Sig.	F_{tabel}
(Constant)	-21,412	9,576	184,664	0,000[b]	3,98
Visual	0,578	0,219			
Auditori	0,402	0,132			
Kinestetik	-0,081	0,081			

Data processed by researchers

Based on Table 9 it can be seen that the value $F_{count} = 184,664$ and $F_{table} = 3,98$. Because the $F_{hitung} > F_{tabel}$ therefore, it can be obtained that there is a significant influence between differentiated learning adjusted to students' learning styles on students' mathematical problem-solving abilities in grades VII-2. Paying attention to the results of the multiple regression analysis, showing the regression equation (*unstandardized coefficients B*) Y = -21,412 + 0,578 (Visual) + 0,402 (Auditory) + (-0,081) (Kinesthetic) which means that every one unit of visual learning style data score, auditory learning style data and kinesthetic learning style data together will affect the math problem-solving ability score in class VII-2 by 0,899 (0,578+0,402-0,081).

For the results of the multiple Linear Regression test on visual, auditory and kinesthetic learning style data on the mathematical problem-solving ability of students in grades VII-3, it can be seen in the table below.

Table 10. Results of multiple linear regression calculation in class vii-3

Model	B	Std. Error	F	Sig.	F_{tabel}
(Constant)	57,590	26,298	47,161	0,000[b]	3,98
Visual	-1,369	0,602			
Auditori	0,947	0,361			
Kinestetik	0,800	0,222			

Data processed by Researchers

Based on table 10 it can be seen that the value $F_{count} = 47,161$ and $F_{table} = 3,98$. Because the $F_{hitung} > F_{tabel}$ therefore, it can be obtained that there is a significant influence between

differentiation learning that is adjusted to students' learning styles on students' mathematical problem-solving abilities in the classroom VII-3. Paying attention to the results of the multiple regression analysis, showing the regression equation (*unstandardized coefficients B*) Y = 57,590 + (-1369) (Visual) + 0,947 (Auditory) + 0,800 (Kinesthetic) which means that every single unit increase in visual learning style data scores, auditory learning style data and kinesthetic learning style data together will affect math problem-solving scores in grade VII-3 sebesar 0,378 (-1,369+0,947+0,800).

CONCLUSION

Based on the results that have been carried out, several conclusions can be drawn, namely based on the results of the Manova test, it was obtained $F_{count} > F_{table}$ that is $15{,}82 > 3{,}15$. This shows that $F_{hitung} > F_{tabel}$ so it can be concluded that there is a significant influence between differentiation learning based on learning styles on critical thinking skills and mathematical problem solving of students, anova test results obtained $F_{count} = 33{,}5$, known in $F_{table} = 3{,}98$. based on the previous provisions, there is a significant difference in critical thinking skills between students with different learning styles after participating in differentiated learning dan based on multiple linear regression analysis, the researcher can conclude that in the third hypothesis, there is a significant influence between differential learning adjusted to students' learning styles on the mathematical problem-solving ability of students.

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