JPPIPA 10(12) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

The Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes

Nanik Maryanti[1*], E. Kus Eddy Sartono[1]

[1] Fakultas Ilmu Pendidikan, Universitas Negeri Yogyakarta, Yogyakarta Indonesia.

Received: August 27, 2024
Revised: October 24, 2024
Accepted: December 25, 2024
Published: December 31, 2024

Corresponding Author:
Nanik Maryanti
nanikmaryanti.2021@student.uny.ac.id

DOI: 10.29303/jppipa.v10i12.8982

Abstract: The study aims to examine the Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes. The study was conducted at SDN 2 Sanggrahan in grade VI students. The sampling technique used the purposive sampling area method. The study used a quasi-experimental design with data collection techniques through post-tests in the form of multiple choice and descriptive questions, observation, documentation and interviews. The data obtained were analyzed using statistical tests including normality tests, Data Analysis using Paired Sample t-Test. Based on the Validity Test, the results showed r = 0.82 α> (0.05) so that all question items showed valid results. Reliability test if the value of α> 0.738 the value is reliable, namely 0.789 Then the results of the normality test of the learning outcome value of 0.389> α (0.05) exceed the significant value, then the variable value is normally distributed, continued using the Paired Sample t-Test, the results of the t-test learning outcomes at a sig value of 0.00 <α (0.05) then reject H0. So it can be concluded that there is an Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes.

Keywords: Differentiated learning; Learning style; Learning Outcomes

Introduction

Education is a conscious effort to guide students through guidance, teaching, and training activities for their future roles. In education, there is a learning and teaching process that aims to expand the knowledge, skills and values that a person has, in this case education can also last a lifetime and involve experience and learning, both formal and non-formal education (Ulfa et al., 2018).

In the context of education, individuals are given the opportunity to acquire essential knowledge and skills in facing various life challenges and making a positive contribution to the social structure of society (Sukarja, 2019). Students tend to dislike learning because they are considered to use methods and strategies that are not varied. Then students also want to learn according to their interests. The education process does not always go well, sometimes there are weak student abilities in a field that is their interest and talent. They tend to be passive, not only because students do not understand the teaching given, but also because the teaching methods and models used are too watchful. This directly affects students' ability to learn. According to observations Early on, SDN 2 Sanggrahan teachers in class VI, on average, students have different characteristics, interests and learning styles. The learning outcomes obtained in class VI are relatively low in the electrical circuit material. This is because students are less interested in the strategies in the learning process. According to Law Number 20 of 2003 on the Education System, Article 11 (Law of the Republic of

How to Cite:
Maryanti, N., & Sartono, E. K. E. (2024). The Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, *10*(12), 9991–10000. https://doi.org/10.29303/jppipa.v10i12.8982

Indonesia, 2003) which states that, "(1) The Government and Regional Government are required to provide services and facilities, and guarantee the implementation of quality education for every citizen without discrimination" (Ajri et al., 2021). In the era of globalization and rapid development of information technology, competition in the world of education is increasingly tight and complex. Each student has different characteristics and learning needs, even in relatively homogeneous classes, there are still some students who need to be considered (Wahyuni, 2022), thus creating challenges for educators to achieve optimal learning outcomes for each individual. Handling individual differences in students can be implemented through the application of learning strategies that focus on student differences and consider their unique characteristics so that it is possible to achieve optimal learning outcomes for each individual) (Rambe et al., 2023). One learning strategy that considers student characteristics is differentiated learning. Differentiated learning strategies, according to Tomlison dalam (Rachmadhani et al., 2023) mean differentiating content, processes, and learning products to meet student learning needs. The learning needs in question are related to learning readiness, learning interests, and learning profiles (P. Sitorus et al., 2022). Student learning needs can be obtained by conducting an assessment before learning begins. By identifying student needs, educators can develop differentiated learning strategies according to their learning needs. Educators can form groups to organize different learning based on characteristics or learning needs for interests or readiness (Pebriyanti, 2023).

Differentiated learning strategies can have a positive impact if properly integrated into teaching and learning (Laumarang et al., 2023). There are two ways to differentiate content by adjusting the material or modifying the way teachers provide students with access to the material to be learned. Process differentiation relates to teachers' efforts to provide different learning strategies according to the diverse learning needs of students in the class with varying levels of ability. Product differentiation means that teachers provide students (Dista et al., 2024).

The concept of a differential learning model is a modern alternative for teachers to improve students' cognitive abilities in the process of taking formal and non-formal education. The education process does not always go well, sometimes there are students who have weak abilities in an area that is their interest and talent. They tend to be passive, not only because students do not understand the teaching given, but also because the teaching methods and models used are too watchful (Yunita et al., 2023).

This directly affects students' ability to learn. Based on these problems, teachers need to know how creative their students are in solving problems and using learning strategies or models in the learning process. Many teaching strategies or models are used by teachers in classroom teaching. One alternative solution is to use differentiated learning (Bilantua et al., 2024). The solution Differentiated learning is an effort to adjust the learning process in the classroom to meet the learning needs of each individual. The accommodations considered are related to the interests, learning profiles, and readiness of students to achieve higher learning outcomes. Differentiated learning is an effort to adjust learning in the classroom to the learning needs of each individual. Adaptations considered are related to learner interests, learning profiles, and readiness to achieve higher learning outcomes (Ismail et al., 2024).

Differentiated learning that is differentiated is not individual learning. But rather a teaching method that pays attention to the strengths and learning needs of students with independent learning strategies (Miqwati et al., 2023). Student-centered education emphasizes more on the process of how students learn and the impact on the development of their learning outcomes, especially science subjects. Science is a subject that does not only use memorization learning but requires an understanding of concepts in the knowledge process through observation activities, new discoveries, and complex data presentation. Science is studied to equip students with the ability to think logically, critically and creatively, these abilities will be needed so that students are able to develop following the changes that occur, science learning involves the activeness of students obtained from their daily lives. Science is a learning content that is close to the student's living environment. Each student is a unique individual with a different living environment, life experience, and thinking skills (Febriana et al., 2023). And also science is learning that invites students to find and solve problems based on the environment around the student. Science itself is a means for students to learn to become thinkers and hard workers. Through hands-on science activities, science invites students to find all forms of solutions to the problems they encounter (Febriyanti et al., 2021).

The role of teachers in implementing differentiated learning will certainly create new things, for example, how to deliver material to students and truly understand the diversity of their students during the learning process. The role of teachers in differentiated learning as guides, giving full responsibility to students to learn according to their abilities, analyzing interests and student learning preferences, increasing various ways for students to conduct scientific investigations in science materials and providing various means where

students demonstrate their learning abilities. Learning objectives and dynamic elements in learning are very important (Sari et al., 2020).

Differentiated learning shows that educators are better able to identify, investigate, and serve the different learning needs of diverse students. By adjusting the learning needs of each student and considering their readiness, interests, and learning profiles, differentiated learning strategies can be utilized. The results of diagnostic assessments carried out at the beginning of the learning process are used to determine the level of initial ability of students and become a guideline for mapping students related to their learning readiness, used to implement differentiated learning (Khofshoh, 2023).

Observations can be made to determine the interests and learning styles of students, both kinesthetic, auditory, and visual. In addition, educators can adapt various learning models, sources, approaches, media, and strategies to meet the needs of their students. Students will later be able to learn according to their respective abilities (Istiqomah et al., 2024).

The application of differentiated learning includes arranging students in groups based on their abilities, giving different assignments to students who have different interests or talents, and giving additional assignments to students who need additional support. Through the application of differentiated learning, researchers hope to be able to influence student learning outcomes. In relation to this, here the researcher is interested in researching "the influence of differentiated learning strategies by paying attention to different learning styles of students to improve science learning outcomes". (Iksan et al., 2023). Learning outcomes are learning achiev ements achieved by students in the teaching and learning process with a person's behavior. To state that a learning process can be said to be successful, each teacher has their own views in line with their philosophy (Umar, 2014). However, to align perceptions, teachers should refer to the current curriculum that has been refined, including that a teaching and learning process about a learning material is declared successful if the specific learning objectives can be achieved (Indrawati et al., 2022).

According to Ismail et al. (2024) learning outcomes are often assumed to reflect the quality of a school. With the learning outcomes obtained, teachers will know whether the strategy used is appropriate or not. If most students get bad grades in the research conducted, this may be due to the approach/method used being inappropriate. Based on this description, the Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students can Improve Science Learning Outcomes Thus, a study will be carried out with the title The Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes.

Method

The research was conducted at SDN 2 Sanggrahan on grade VI students in the electrical circuit material in the even semester of the 2022/2023 academic year. The sample selection used the purposive sampling area method, namely the determination of samples based on specific criteria for the objects expected by the researcher (Marginingsih, 2017). The criteria intended were that the samples used must be homogeneous and receive recommendations from the teacher. The researcher used two classes as samples, namely the control class (X2) and the experimental class (X1). In the experimental class, learning treatment was given with the use of differentiated learning, while in the control class, learning treatment was not given (but used conventional learning). The quasi-experimental research design is that the researcher did not carry out randomization in determining the subjects of the research group (Fatriani et al., 2018). The researcher used two classes as samples and the design design used was the post-test only control design where the post-test was held after learning was carried out to determine the effect of the treatment. The post-test only control design research design can be seen in Table 1.

Tabel 1. Rancangan Desain Penelitian Post-Test Only Control Design

Class	Treatment	Posttest
Eksperimen	X_1	O1
Kontrol	X_2	O2

The data collection technique uses a multiple choice test containing 10 questions. Apart from that, observations take the form of sheets given to observers to make observations during the learning process, documentation related to photos of activities during the research, as well as interviews with science teachers at the school regarding learning activities, methods, models and media commonly used during learning.

Data analysis techniques use measurement of learning outcomes, especially in the cognitive or knowledge domain. After the results are obtained, they are then categorized into the percentage of completeness in accordance with the K13 guidelines which have been adjusted to the minimum completeness criteria (KKM) at the school, namely 70. The percentage of completeness is shown in Table 2.

Table 2. Percentage of Completeness

Nilai	Completenes
≥ 70	Complete
< 70	Not Complete

Furthermore, the post-test data that has been obtained will be analyzed using the Paired sample t test to determine whether learning after using the PBL model assisted by Phet Simulation media has an influence on student learning outcomes or not. The data must be tested for normality first before carrying out the t-test to decide which test will be used next. The following is the research flow.

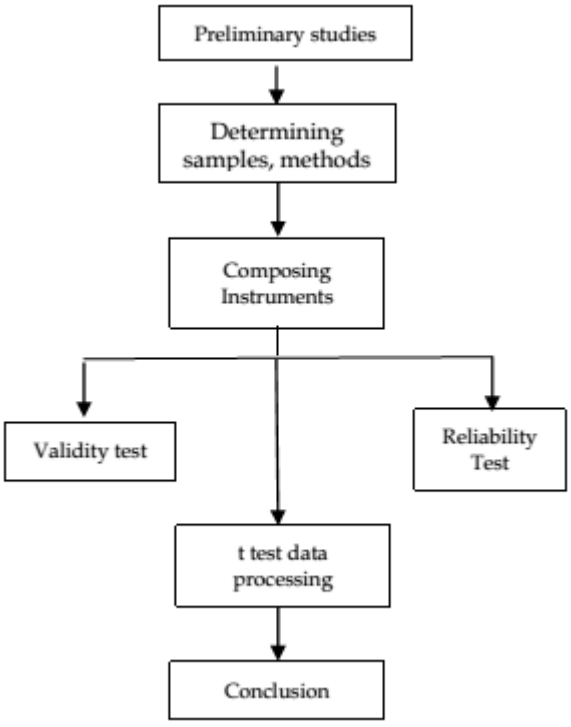

Figure 1. Research flow

Results and Discussion

The method used in this article is quantitative research. The examination model used is pre-Test and Post-Test using Likert scale estimation. The population in this logic work is the students of SDN 2 Sanggrahan class totaling 60 students, by taking a sample using purposive examination procedure so that the number of tests is 30 students from class VI B and 30 class A. This concentration is only for one purpose class to be given inspirational treatment. Information collection using 10 question items to measure student learning outcomes is formed into an instrument.

This test was directed by researchers using a purposive examination procedure, the sample used was 30 students from a population of 30 students taken from class VI SDN 2 Sanggrahan. The implementation was carried out for 1 meeting. Before the learning began, a pre-test was given and after being given treatment, a post-test was given.

Data Processin

The data is analyzed using SPSS, so that data that has been tabulated in Excel can be directly transferred to the t-test statistical formula. Sudjana (2013: 47) said that to create a list of frequency distribution tables with the same class length, first carry out the following processing.

Tabel 3. Descriptive Analysis

Data Analysis	Minimum	Maximum	Average ($\bar{x}$)	Standard deviation
Pre Eks	11	61	33.90	12.653
Post Eks	76	99	87.17	6.303
Pre-Kon	10	61	29.13	11.530
Post Kon	46	79	65.63	9.313

In this study, measurements were carried out on student learning outcomes before and after learning, namely Pre-Test and Post-Test. Data analysis used descriptive analysis techniques. The results of the analysis are shown in Table 3. Measurement of student learning outcomes aims to test the effectiveness of the application of differentiated learning strategies that have been used during learning. The measurement data were analyzed using descriptive statistics. The average pretest score for the control class was 29.13 while the average post-test score for the control class was 65.63. For the experimental class, the pretest score was 33.90 while the average post-test score was 87.17, which showed an increase. So, it can be concluded that there is a difference in learning outcomes before and after in the experimental class and the control class. According to the results above, the highest score was obtained in the experimental class. This means that the application of differentiated learning strategies is more effective than learning using conventional.

Validity and Reliability Test

Validity test using Pearson Correlation method. Question items are said to be valid if Pearson coefficient is more than r-table. In addition, it can be seen from the significance value, if the significance value is less than α (0.05) then the question item is considered valid. The following are the results of the validity test of each question item of all variables (Riduwan, 2012). The validity test is intended to determine whether the instrument used actually measures what should be measured. Validity is tested through Confirmatory Factor analysis. If Rcount> 0.50 the question item is valid (Ghozali, 2004. Validity testing is carried out using the

product moment correlation formula, r count is obtained from the SPPS output results version 26, the value is then compared with the r table value from the statistics book. The complete validity test can be seen in Table 1.2 which shows that all of the items used to measure the questions used in this study have a correlation coefficient greater than the r-table, where for a sample of 30 students of SDN 2 Sanggrahan class VI D using different classes with 10 questions, the r-table value is 0.81 with a significance level of 0.05 or 5%. The resulting r-count value is presented in Table 4. These results indicate that all of these indicators are valid.

Table 4. Pre-Test Validity Test Results Critical thinking skills

Question Items	R_{table}	Person Correlation	Description
1	0.396	0.65	Valid
2	0.396	0.54	Valid
3	0.396	0.63	Valid
4	0.396	0.71	Valid
5	0.396	0.69	Valid
6	0.396	0.64	Valid
7	0.396	0.57	Valid
8	0.396	0.81	Valid
9	0.396	0.79	Valid
10	0.396	0.41	Valid

Based on the table above, all question items have valid items because Rcount >RTable. This means that the instrument is able to measure what is desired and capable disclose the researched data accurately. Based on the table above, all question items have valid items because Rcount>RTable. This means that the instrument is able to measure what is desired and is able to reveal the data studied accurately. Based on Table 3, the results of the validity test on all learning outcome variable items with a total of 10 items each show that the Pearson coefficient value is more than the r-table 0.82 and the significance value is less than α (0.05). So all question items in the questionnaire to represent all variables in this research are valid. Then proceed with the reliability test, namely the reliability or consistency or trustworthiness value of a measuring instrument. Researchers used the Cronbach's Alpha method to test the reliability value of each item from all variables. A variable is said to be reliable if it provides a Cronbach's Alpha value > 0.70. Following are the results of the reliability test.

Table 5. Pre-Test Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
.789	10

Based on Table 5, the results of the Pre-Test reliability test can be seen that the Cronbach's Alpha value for all variables is more than 0.70. So it can be concluded that all question items from all variables are reliable or consistent. Because all items for each variable are valid and reliable, the next analysis can be continued.

Normality Test

The researcher tested normality using the Shapiro Wilk test, because the sample in the study was less than 30. The hypothesis underlying the data normality test was:

H0: Data is normally distributed

H1: Data is not normally distributed

The following are the results of the normality test of the learning motivation variable.

Table 6. Data Normality Test Results

Variable	Class	Shapiro Wilk test statistic	Value Sig.
learning	Experiment	0.964	0.389
outcomes	Control	0.957	0.229

Based on Table 6, it shows that changes in learning outcomes have a significance value of more than α (0.05), so the decision to accept H0 is obtained. It can be concluded that the learning outcome variables are normally distributed. Then the analysis can be continued using the t-test.

T-test

In this section, it will be reviewed whether there are significant differences in the two tests. After implementing a differentiated learning strategy to improve student learning outcomes, the analysis uses statistical testing, namely the Paired Sample t-Test, where the aim is to compare the values of unpaired samples. The Paired Sample t-Test is used to test whether the average of a variable is statistically significantly different when compared to the average values known as assumptions or hypothesized values. This study aims to determine whether the average learning outcome values are different or not. The hypothesis in this research is:

H0 = There is an Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes

H1 = There is no Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes

The following are the results of the paired sample t-test t-test analysis.

Table 7. Paired Sample t-Test Results

Variable	Statistic-t	Value Sig.
Learning outcomes	17.973	0.000

Based on Table 7, the results of the t-test of learning outcomes obtained a significance value of less than 0.05, then reject H_0. Based on the test results in the equal variances assumed section, it appears that the Sig.(2-tailed) value < α is 0.001 < 0.05. Thus, the decision taken is to reject $H0$ and the final conclusion is that There is an Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes.

Discussion

From the description of this study, the researcher used the pre-test and post-test learning outcomes in the experimental class and the control class. The purpose of learning using differentiated learning is to help improve student learning outcomes. Before the researcher conducted the research, the researcher first validated the research instruments needed during learning. From the validator's opinions and suggestions, it can be concluded that the entire research instrument compiled by the researcher has reached a valid category through validation. Then test the validation of the test items and reliability. The results are that the items tested are valid and reliable.

The results obtained from the data above are there is an Effect of the Application of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes. After the hypothesis test was carried out using the t test of 0.001. After the hypothesis test was carried out, there was an influence between the two variables with a coefficient of determination There is an Effect of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes Based on the results of data processing, the results of the graph of student learning outcomes before and after learning can be seen

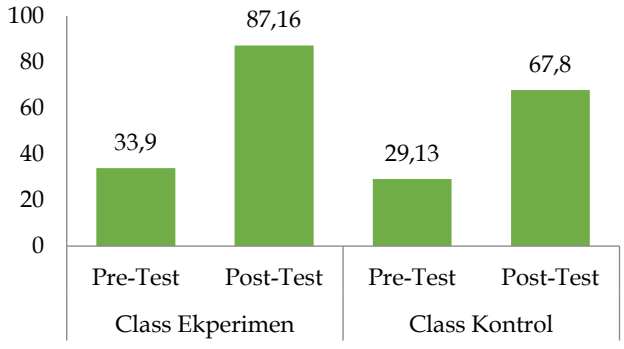

Figure 2. Learning outcome graph

Based on the figure 2, it can be seen that there was an increase in learning outcomes before using differentiated learning. The measurement data were analyzed using descriptive statistics. The average pretest score for the control class was 29.13 while the average post-test score for the control class was 67.8. For the experimental class, the pretest score was 33.9 while the average post-test score was 87.16, which showed an increase. So, it can be concluded that there is a difference in learning outcomes before and after in the experimental class and the control class. According to the results above, the highest score was obtained in the experimental class. This means that learning using differentiated learning is more effective than using conventional learning.

So, it can be concluded that there is a difference in student learning outcomes before and after learning using differentiated learning strategies. Validity Test Results show r = 0.79 < (0.05) so that all things show valid results then from the dependency test if the value is> 0.70, the value is reliable, precisely 0.789, from the consequences of the unshakable legitimacy and quality test, all factors are solid/predictable because all things are important for each variable. Then a normality test is carried out before solving using the t-test, the results of the regularity test for the inspiration price of 0.267> value (0.05). From this value it shows that the free factor is more important than the large value, so the variable value is usually adjusted. Then using the t-test Based on the test results in the equal variances assumed section it appears that the Sig. (2-tailed) value < α is 0.001 < 0.05. Thus, the decision taken is to reject $H0$ and the final conclusion is that there is an Effect of Implementing the Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes. The conclusion is that there is a significant difference in the average value of student learning outcomes between the two classes. Because the value obtained by the experimental class is higher than the control class, it is concluded that learning uses a differentiated learning strategy to improve Learning outcomes of grade VI elementary school students on the subject of Electrical Circuits. Based on the post-test scores and the results of the statistical tests obtained, it can be said that the differentiated learning strategy approach has proven to be efficient and has an effect on student learning outcomes.

The application of differentiated learning using differentiated learning was carried out in grade VI on the subject of electrical circuits which grouped students into learning groups with a learning design referring to student learning interests. The results of the analysis of research data that have been carried out show

differences in the average learning outcomes obtained by the control class and the experimental class. In the control class, conventional learning strategy treatment was given and in the experimental class, differentiated learning strategy treatment was given as many as 1 meeting in each class with the subject of Electrical Circuits. In the experimental class, the researcher grouped students based on learning style. Learning style is a person's way of learning and how they reason. There are three learning styles, namely visual (through visualization), auditory (through hearing), and kinesthetic (through movement or motor activity).

Based on the learning style of students, learning is carried out in various ways. In differentiated learning strategies, there are 3 types of differentiation activities: 1) content differentiation; 2) process differentiation; 3) product differentiation (D. M. Sitorus et al., 2024). Content differentiation is related to the material or content of the subject that will be taught to students by paying attention to the mapping of student learning needs such as student learning profiles, readiness, and student learning interests. Process differentiation is a learning strategy prepared by teachers by differentiating students in the learning process that each of them undergoes to gain knowledge. In this activity, teachers must pay attention to how the right methods and techniques will be used in learning so that the learning process can run well. Product differentiation is a learning strategy prepared by teachers by differentiating student learning outcomes according to student readiness. The products referred to in this case are the results of students' work from the material studied such as writing, videos, recordings, written works, and other works related to the learning material. After the results of the t-test are obtained, the hypothesis is accepted, so there is an influence of learning on student learning outcomes. This is in line with other research on differentiated learning strategies also conducted by: (1) Sitorus (2022), with the title The Influence of Differentiated Learning Strategies on Learning Outcomes of Class VIII Students of SMP Negeri 2 Manduamas. The results of the study using differentiated learning strategies can have an influence on increasing student learning outcomes by 12.58%. (2) (Safarati et al., 2023), with the title The Influence of Differentiated Learning Strategies on Learning Outcomes of Students of SMA Negeri 1 Lahusa, it can be concluded that there is an influence of the strategy differentiated learning on the learning outcomes obtained by students. This is based on the results of the one-tail t-test hypothesis test, namely the t-count value> t-table, which is 2.381> 2.014, which means Ha is accepted, so it can be concluded that there is a significant effect of the treatment of differentiated learning strategies in the experimental class on the learning outcomes obtained by students. Several studies on differentiated learning strategies in various subjects such as Indonesian, art, culture, and science show better research performance and good learning outcomes with differentiated learning strategies (Marlina et al., 2023; Rahmayanti, 2023; Yanti et al., 2022). In addition, research shows that differentiated learning strategies produce excellent results in mathematics and geometry (Hidayat et al., 2023). Differentiated teaching has a tremendous impact on the classroom, school and, most importantly, students. Each student has unique abilities and cannot be treated the same. Therefore, it is very important to create learning opportunities that are in accordance with students' interests and talents. Thus, students feel accepted and valued according to their abilities. Researchers will use this information to examine whether there is a difference between learning strategies and creative and critical thinking skills. "Every student has unique skills and requires a different approach. Therefore, it is important to provide learning opportunities that meet students' needs. In this way, students experience that they are accepted and valued according to their abilities" (Safarati et al., 2023; Susanti et al., 2019).

Research conducted by Suwartiningsih (2021) revealed that differentiated learning can improve learning outcomes. In cycle I, students experienced an increase in the number of students who completed 15 students (51.72%) while students who had not completed were 14 students (48.28%) with an average score of 66.55. Then in cycle II there was a very high increase compared to the previous cycle, namely students who had reached the KKM were 28 students (96.55%), while students who had not completed it were 1 student (3.45%) with an average score of 80. The results of this study are in line with Iskandar's research which shows that differentiated learning can improve learning outcomes in report text material with the achievement of learning completeness from the initial pre-cycle conditions obtained by 36.36% to 66.67 in cycle I and in cycle II reaching 90.91%. The increase in learning outcomes through differentiated learning can be seen from the increase in students' pleasure, enthusiasm and motivation in understanding the report text material which is also influenced by internal and external factors. The results of the study Nawati et al. (2023) are not much different from other studies, which show that the application of problem-based learning models with differentiated learning strategies to class students VIII can improve learning outcomes. The activeness of students in the learning process has increased, such as increasing student attention in following the learning process. Students become more active in asking

questions to the teacher or responding to questions from the teacher, students are more active in discussing in their groups to solve a problem, and increasing student activity in collecting information related to the material in the learning. The activeness of teachers in the learning process has increased compared to when teachers applied the learning model before the study. The interaction between teachers and students has increased because teachers are required to direct students in solving problems and pay more attention to students who need special treatment in learning so that these students are actively involved in learning.

Student learning outcomes have increased where the average student learning outcomes achieve individual completeness, namely meeting the KKM set by the school and classical completeness is achieved which is marked by a minimum of 80% of students meeting the KKM, which is 70. This was achieved in Cycle II with the average student learning outcomes increasing to 81.5 with classical completeness of 86.67%. Specifically in science learning, a differentiated approach can be an alternative approach that can be applied in class to accommodate the different learning needs of students. This is in line with research (Iksan et al., 2023) which shows that a differentiated approach to science subjects applied at the elementary school level by paying attention to learning styles is more effective in increasing students' motivation and understanding of science learning than traditional teaching methods. Students support the implementation of differentiated learning. Meanwhile, a differentiated approach is also suitable if applied at the junior high school level because it has a positive influence on students' learning outcomes, learning achievements, and critical thinking skills (Marlina et al., 2023). The use of a differentiated approach can also be carried out at the high school level in science learning, where the results of the study showed that the application of differentiated learning with the blended learning's station rotation method to improve student learning outcomes in hydrostatic pressure material (Rachmadhani et al., 2023). From several studies above, it can be understood that there are many positive things from the application of differentiated learning, so it is very suitable to be applied in science learning. Differentiated learning can provide sufficient space for initiative, creativity, and independence according to the talents, interests and physical and psychological development of students (Marlina et al., 2019). Through differentiated learning, all students' needs in learning science can be accommodated according to their interests or learning profiles. Differentiated learning helps teachers to recognize and design learning that is in accordance with the nature of science, namely by paying attention to the differentiation of content, process, and product. Differentiation of content carried out by teachers aims to modify the curriculum and subject matter according to the learning style and learning profile of students. Differentiation of the process by paying attention to readiness and learning style, helps students process ideas, information and interact with materials in science learning. Differentiation of products provided by teachers can help students in showing what has been learned. Students have the opportunity to demonstrate understanding according to what they like, for example through posters, writing, songs, poems or videos. A comfortable learning environment also affects students in the science learning process, so that they are able to achieve optimal learning outcomes.

Conclusion

Based on the results of the research and data processing that has been done, it can be concluded that there is an Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes. Based on the test results in the equal variances assumed section, it appears that the Sig.(2-tailed) value < α is 0.001 < 0.05. Thus, the decision taken is to reject $H0$ and the final conclusion is that there is an Influence of Differentiated Learning Strategies by Paying Attention to Different Learning Styles of Students to Improve Science Learning Outcomes.

Acknowledgments
Thank you to God who has given me health and grace so that the writer can finish this research well, further thanks to the supervisor, and to the principal of SDN 2 Sanggrahan along with the teachers and students. as well as thanks to my family for their support to me

Author Contributions
Nanik Conceptualized the research ide, designed of methodology, analyzed data, management and coordination responsibility E. Kus Eddy Sartono

Funding
This research was funded by Riset (Universitas Negeri Yogyakarta).
.

Conflicts of Interest
The authors declare np conflict of interest. The funders had no role in the design of the study.

References

Ajri, A. S., & Diyana, T. N. (2021). Pengembangan E-Modul berbasis problem based learning berbantuan liveworksheets untuk mengoptimalkan keterampilan pemecahan

masalah. *JKPI: Jurnal Kajian Pendidikan IPA Program Studi Pendidikan IPA*, *1*(2), 69–75. Retrieved from https://journal.uniga.ac.id/index.php/jkpi/article/download/2377/pdf

Bilantua, A., & Panigoro, M. (2024). Pengaruh Pembelajaran Berdiferensiasi Terhadap Hasil Belajar Siswa Pada Mata Pelajaran IPS Terpadu Di SMP Negeri 1 Tomilito Tomilito Gorontalo Utara. *Jurnal Ilmu Pendidikan Nonformal*, *10*(January), 439–448. Retrieved from https://ejurnal.pps.ung.ac.id/index.php/Aksara/article/view/2422%0Ahttps://ejurnal.pps.ung.ac.id/index.php/Aksara/article/download/2422/1676

Dista, D. X., Hermita, N., & Triani, R. A. (2024). Pengaruh Pembelajaran Berdiferensiasi di Sekolah Dasar. *Journal of Education Research*, *5*(2), 994–999. https://doi.org/10.37985/jer.v5i2.964

Fatriani, E., & Sukidjo, S. (2018). Efektivitas metode problem based learning ditinjau dari kemampuan berpikir kritis dan sikap sosial siswa. *SOCIA: Jurnal Ilmu-Ilmu Sosial*, *15*(1), 11–26. https://doi.org/10.21831/socia.v15i1.20089

Febriana, R. N., Suryani, D. I., & Taufik, A. N. (2023). Pengembangan E-Modul Berbasis Socio-Scientific Issues pada Tema Food Loss and Food Waste untuk Melatih Kemampuan Berpikir Kritis. *Jurnal Pendidikan Mipa*, *13*(2), 445–453. https://doi.org/10.37630/jpm.v13i2.1004

Febriyanti, D., Sjaifuddin, S., & Biru, L. T. (2021). Analisis Proses Pembelajaran IPA Terpadu Dalam Pelaksanaan Kurikulum 2013 Di SMP Kecamatan Sumur. *PENDIPA Journal of Science Education*, *6*(1), 218–225. https://doi.org/10.33369/pendipa.6.1.218-225

Hidayat, M., Santoso, G., Mega Lestari, N., & Muhammadiyah Jakarta, U. (2023). Pengembangan E-Modul Berbasis Web untuk Mendukung Kemampuan Representasi Matematis untuk Meningkatkan Karakter Mandiri dan Critical Thinking. *Jurnal Pendidikan Transformatif (JPT)*, *2*(3), 521–540. https://doi.org/10.9000/jpt.v2i4.635

Iksan, K. M., Alfiandra, A., & Murniati, S. R. (2023). Implementasi Pembelajaran Berdiferensiasi dalam Meningkatkan Hasil Belajar Mata Pelajaran PPKn Siswa SMP. *Jurnal Basicedu*, *7*(3), 1900–1910. https://doi.org/10.31004/basicedu.v7i3.5716

Indrawati, E. S., & Nurpatri, Y. (2022). Problematika Pembelajaran IPA Terpadu (Kendala Guru Dalam Pengajaran IPA Terpadu). *Educativo: Jurnal Pendidikan*, *1*(1), 226–234. https://doi.org/10.56248/educativo.v1i1.31

Ismail, I. A., Jhora, F. U., Qadriati, Q., & Insani, M. (2024). Enhancing Science Learning Activities through the Implementation of Discovery Learning and Teaching at the Right Level Method. *Jurnal Penelitian Pendidikan IPA*, *10*(4), 1886–1895. https://doi.org/10.29303/jppipa.v10i4.7359

Istiqomah, L., Reffiane, F., & Sanjaya, D. (2024). Pengaruh Strategi Pembelajaran Berdiferensiasi terhadap Hasil Belajar IPAS Siswa Kelas V SDN Sawah Besar 01. *Journal on Education*, *06*(03), 16153–16158. https://doi.org/10.31004/joe.v6i3.5478

Khofshoh, J. (2023). Efektivitas Model DL Berbasis Pembelajaran Berdiferensiasi Dan Model PBL terhadap Hasil Belajar. *Mathematic Education Journal*, *6*(2), 1–7. https://doi.org/10.37081/mathedu.v6i2.5223

Laumarang, S. N., Odja, A. H., & Supartin, S. (2023). Pengaruh Penerapan Pembelajaran Berdiferensiasi Menggunakan Model Pembelajaran Discovery Learning Terhadap Hasil Belajar Siswa pada Konsep Pemanasan Global. *Jurnal Tadris IPA Indonesia*, *3*(3), 315–326. https://doi.org/10.21154/jtii.v3i3.2337

Marlina, I., & Aini, F. Q. (2023). Perbedaan Pembelajaran Berdiferensiasi Berdasarkan Kesiapan Dengan Gaya Belajar Terhadap Hasil Belajar Siswa. *EDUSAINTEK: Jurnal Pendidikan, Sains Dan Teknologi*, *11*(1), 392–404. https://doi.org/10.47668/edusaintek.v11i1.1017

Miqwati, M., Susilowati, E., & Moonik, J. (2023). Implementasi Pembelajaran Berdiferensiasi Untuk Meningkatkan Hasil Belajar Ilmu Pengetahuan Alam Di Sekolah Dasar. *Pena Anda: Jurnal Pendidikan Sekolah Dasar*, *1*(1), 30–38. https://doi.org/10.33830/penaanda.v1i1.4997

Pebriyanti, D. (2023). Pengaruh Implementasi Pembelajaran Berdiferensiasi pada Pemenuhan Kebutuhan Belajar Peserta Didik Tingkat Sekolah Dasar. *Jurnal Kridatama Sains Dan Teknologi*, *5*(01), 89–96. https://doi.org/10.53863/kst.v5i01.692

Rachmadhani, S. A. D., & Kamalia, P. U. (2023). Analisis Strategi Pembelajaran Berdiferensiasi terhadap Hasil Belajar Peserta Didik: Systematic Literature Review. *Asatiza: Jurnal Pendidikan*, *4*(3), 178–192. https://doi.org/10.46963/asatiza.v4i3.1231

Rahmayanti, S. (2023). Pengaruh Penerapan Pembelajaran Berdiferensiasi Terhadap Hasil Belajar Siswa Kelas Iv Upt Spf Sd Inpres Antang I Kota Makassar. *Jurnal DIDIKA: Wahana Ilmiah Pendidikan Dasar*, *9*(2), 252–263. https://doi.org/10.29408/didika.v9i2.24136

Rambe, Y., Khaeruddin, & Ma'ruf. (2023). Pengaruh Model Problem Based Learning Terhadap Kemampuan Berpikir Kritis Dan Hasil Belajar Ipa Pada Siswa Sekolah Dasar. *Hybrid: Jurnal*

Pendidikan Dan Pembelajaran Sains, *2*(2), 1–19. https://doi.org/10.51574/hybrid.v2i2.1274

Safarati, N., & Zuhra, F. (2023). Literature Review: Pembelajaran Berdiferensiasi Di Sekolah Menengah. *GENTA MULIA: Jurnal Ilmiah Pendidikan*, *6*(November), 33–37. https://doi.org/10.61290/gm.v14i1.17

Sari, R. I., & Wulandari, S. S. (2020). Pengembangan Lembar Kegiatan Peserta Didik (LKPD) Berbasis Pendekatan Saintifik Mata Pelajaran Humas dan Keprotokolan Semester Gasal Kelas XI OTKP Di SMK YPM 3 Taman. *Jurnal Pendidikan Administrasi Perkantoran (JPAP)*, *8*(3), 440–448. https://doi.org/10.26740/jpap.v8n3.p440-448

Sitorus, D. M., & Dalimunthe, M. (2024). Pengembangan Instrumen Tes Diagnostik Five-Tier Multiple Choice untuk Mengidentifikasi Miskonsepsi Siswa pada Materi Kesetimbangan Kimia. *Jurnal Pendidikan Kimia FKIP Universitas Halu Oleo*, *9*(1), 55–72. https://doi.org/10.36709/jpkim.v9i1.77

Sitorus, P., Tumanggor, R. M., Sigiro, M., Simanullang, E. N., & Laia, I. S. A. (2022). Pengaruh Strategi Pembelajaran Berdiferensiasi terhadap Hasil Belajar Peserta Didik Kelas VIII SMP Negeri 2 Manduamas. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *5*(8), 2883–2890. https://doi.org/10.54371/jiip.v5i8.768

Sukarja, W. (2019). Penggunaan Model Pembelajaran Make a Match Sebagai Upaya Meningkatkan Prestasi Belajar Agama Hindu. *Mimbar Ilmu*, *24*(3), 338. https://doi.org/10.23887/mi.v24i3.21468

Susanti, D. Y., Azainil, & Kukuh. (2019). Peningkatan Hasil Belajar Matematika Siswa melalui Pembelajaran Tematik. *Jurnal Inovasi Edukasi*, *2*(1), 26–37. https://doi.org/10.35141/jie.v2i1.756

Ulfa, S. widya, Afdan, R. khoir, Nabilla, M., Achyri, P. R., & Nayla. (2018). Identifikasi Jenis Lumut Kerak (Lichenes) Di Kecamatan Percut Sei Tuan Pada Desa Bandar Setia, Sampali Dan Tembung. *Jurnal Ilmiah Wahana Pendidikan*, *3*(1), 10–27. Retrieved from https://medium.com/@arifwicaksanaa/pengertian-use-case-a7e576e1b6bf

Umar. (2014). Media Pendidikan " Peran dan Fungsinya Dalam Pembelajaran. *Jurnal Tarbawiyah*, *11*(1), 133–135. Retrieved from https://e-journal.metrouniv.ac.id/tarbawiyah/article/view/364

Wahyuni, A. S. (2022). Literature Review: Pendekatan Berdiferensiasi Dalam Pembelajaran IPA. *Jurnal Pendidikan MIPA*, *12*(2), 118–126. https://doi.org/10.37630/jpm.v12i2.562

Yanti, N. S., Montessori, M., & Nora, D. (2022). Pembelajaran IPS Berdiferensiasi di SMA Kota Batam. *Ranah Research : Journal of Multidisciplinary Research and Development*, *4*(3), 252–256. https://doi.org/10.38035/rrj.v4i3.498

Yunita, E., Rachmawati, F., & Hilaliyah, T. (2023). Meta Analisis Penerapan Pembelajaran Berdiferensiasi untuk Meningkatkan Hasil Belajar Siswa. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *6*(10), 7499–7505. https://doi.org/10.54371/jiip.v6i10.2971