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The Relationship between Parenting Patterns and Learning Independence on Learning Outcomes of Elementary School Science Content

Puput Wijayanti[1]*, Desi Wulandari[1]

[1] Elementary School Teacher Education, Faculty of Education, Universitas Negeri Semarang, Indonesia

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Corresponding Author:
Puput Wijayanti
puputwijayanti211299@gmail.com

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Abstract: Problems in Grade IV of the Kartika Cluster State Elementary School, Blora Regency, show that science learning outcomes are still low. Based on interviews with teachers, it is hypothesized that factors that affect learning outcomes include Parenting and Learning Independence. The objectives of this study are: to examine the relationship between Learning Independence and science learning outcomes; to examine the relationship between Parenting Styles and science learning outcomes; to examine the relationship between Learning Independence and Parenting Patterns on students' science learning outcomes. This study uses a quantitative method with a type of correlation research. The results of the study showed: there was a positive and significant relationship between Parenting and Science learning outcomes with a contribution of 71.50%; there is a positive and significant relationship between Learning Independence and Science learning outcomes with a contribution of 70.80%; there was a positive and significant relationship between Parenting and Learning Independence together on students' science learning outcomes with a contribution of 73.10%. The conclusion in this study is that there is a positive and significant relationship between Parenting and Learning Independence on the learning outcomes of science students in Grade IV of the Kartika Cluster State Elementary School, Blora Regency. The suggestion in this study is that students are expected to be able to optimize the existing Learning Independence and Parental Parenting Patterns to improve learning outcomes.

Keywords: Learning Outcomes; Learning Independence; Parenting

Introduction

Every human being is able to develop his potential through the learning process. Law of the Republic of Indonesia Number 20 of 2003 concerning the Education System Chapter 1 Article 1 Paragraph 1 states that Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual strength, religious self-control, personality, intelligence, noble character, and the skills they need. society, nation and state. Article 3 of Law No. 20 of 2003 concerning the National Education System emphasizes that National Education functions to develop the ability of the formation of the character and civilization of a dignified nation in order to become human beings who believe in and fear God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens. Learning is important for changing the behavior of each individual, including everything that everyone works and does. Learning plays an important role in a person's development, habits, attitudes, beliefs, goals, personality, and perceptions. Therefore, a person needs

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to master the basic concept of learning in order to be able to understand that learning activities are important in the psychological process. A person's attempt to change a new behavior as a whole as a result of his own experiences and interactions with his environment is called learning (Wardono & Mariani, 2023); (Darling-Hammond et al., 2020); (Abedini et al., 2024).

Learning is a movement that is deliberately carried out by a person to obtain new information that causes behavioral changes, both tendencies and behavior. Two kinds of factors that affect learning are internal and external (Ivan Stevanus et al., 2022). Learning is influenced by a number of internal factors, including: Physical factors include physical well-being, physical disorders that can have an impact on learning activities due to shortcomings that can hinder the learning process; and Psychological influence on learning includes insight, which is a person's capacity to adapt to other climates, attention, especially a person's active attention to an object, learning independence, or a tendency to be involved in an activity, talent, or capacity to be involved in educational activities, motives, or encouragement to carry out learning activities, maturity, also known as readiness to participate in a learning activity, the readiness, or willingness of individuals to engage in learning activities.

Some external factors that can affect learning activities are (Fadilah et al., 2021); (Chen et al., 2023): Family factors such as parenting style to educate their children, bonds between family members, home climate, family financial situation, understanding of family; and sixth, cultural context; School factors that affect students' learning activities, such as teaching methods, curriculum, teacher-student relationships, student-teacher relationships, school rules, learning tools, school time, lesson standards, building conditions, learning methods, and homework; and Student activities in the environment, mass media, associations, and various forms of life and interactions that support the learning process. Factors for learning success include: learning must be fun; interactivity; opportunities to practice; Proper and available feedback; and factors that guide and train students in an informal environment (Har et al., 2021); (Maman et al., 2023). Factors that affect learning outcomes are the internal and external conditions of students.

Learning independence, physical, mental, and social conditions are examples of internal conditions. Learning outcomes will also be influenced by external conditions which include parental parenting, the level of difficulty of the learning materials studied, learning location, climate, environmental conditions, and community learning culture. Parenting is a pattern of behavior in establishing relationships with children to form children's characters. There are many ways of parenting that parents do in shaping children's characters, parenting styles include authoritarian, permissive and democratic (Berkowitz et al., 2021); (Vogelbacher & Attig, 2022) Parenting is the way parents educate, direct, and care for their children. This includes communication styles, discipline, awards, and supervision. Some types of parenting include authoritarian (strict), permissive (loose), democratic (balanced), and uncaring. Authoritative parenting is considered the most effective because it creates a balance between rules and freedoms and provides support and understanding to children (Epstein, 2019); (Nie et al., 2022); (Bi et al., 2018). Independence is usually characterized by the ability to determine oneself, be creative and initiated, regulate behavior, be responsible, be able to restrain oneself, make one's own decisions, and be able to overcome problems without any influence from others (Aningsih et al., 2022); (Bauer et al., 2022). Learning independence is a person's ability to organize, manage, and take responsibility for their own learning process without too much involvement from other parties such as teachers or instructors.

It involves the ability to motivate yourself, plan learning goals, find the necessary resources, evaluate progress, and overcome obstacles that arise during the learning process. A person who has good learning independence tends to have a strong intrinsic motivation to learn, has good time management skills, is able to overcome obstacles and obstacles, and has the ability to find information and learn independently. Learning independence is becoming increasingly important in the ever-evolving world of education, where lifelong learning and adaptation to change are the keys to success (Abu & Rohmad, 2022). Parenting and learning independence have an influence on learning outcomes, one of which is science learning outcomes. Science learns about the world of matter, both living things and observed inanimate objects.

Science is a collection of knowledge that is systematically arranged, and in its use is generally limited to natural phenomena (Vaiopoulou et al., 2023). Parenting that encourages experiential learning, such as visits to science museums or outdoor activities, can enrich students' science learning experience. Parents involved in providing access to such experiences can make a great contribution to a student's practical understanding of science (Paul et al., 2022); (Ahmed et al., 2024); (Kim, 2022). The concepts in science can often be applied in the context of daily life. By understanding students' learning independence in science subjects, teachers can help students relate learning to their experiences outside of the classroom. The researcher has conducted pre-research by conducting interviews, and documentation about parenting and learning independence in grade IV of the Kartika Cluster, Blora

Regency. The Kartika Cluster of Blora Regency consists of Brabowan State Elementary School 1, Brabowan State Elementary School 2, Brabowan State Elementary School 3, Biting State Elementary School 1, Biting State Elementary School 2, Gagakan State Elementary School 1, and Gagakan State Elementary School 2.

Based on the information obtained by the researcher through interviews with teachers of grade IV of the Kartika Cluster of Blora Regency, students' learning independence is mostly not maximized from the student's initiative when answering or asking questions, some students rely on the help of friends when doing assignments, there are students who cheat when doing homework, and there are students who have not done homework so that the social attitude of students is said to be sufficient, especially in attitudes responsibility and confidence of students in participating in learning. Teachers should always provoke students to be active and more confident. The development of children's independence is also influenced by the way parents nurture and educate children. Good parenting will encourage the development of children's independence so that development will be optimal, while poor parenting will hinder children's learning independence. This is because parents do not equip their children from a condition of dependence to become an independent person.

In addition, parents are busy working, so entrusting learning affairs is limited to learning at school. Communication between parents and classroom teachers only occurs when taking report cards, and parent associations but not optimally. Parenting and learning independence are factors that affect student learning outcomes. The existence of good parenting supported by good student learning independence will produce good learning outcomes as well. The objectives of this study are: To examine the relationship between parental parenting and the learning outcomes of grade IV students of the Kartika Cluster State Elementary School, Blora Regency; Examining the relationship between learning independence and the learning outcomes of grade IV students of the Kartika State Elementary School, Blora Regency; and Examining the relationship between parenting and learning independence together on the learning outcomes of grade IV students of the Kartika State Elementary School, Blora Regency. Based on the description above, the following research title was determined "The Relationship between Parenting and Learning Independence on the Learning Outcomes of Science Subjects for Grade IV Students of Kartika Cluster, Blora Regency".

Method

This study uses a quantitative method with a type of correlation research. Researchers to find out the relationship between two or more variables, without treating existing data. The purpose of this study is to determine the relationship between Parenting and Learning Independence with Science Learning Outcomes of Grade IV Students of the Kartika State Elementary School, Blora Regency. The place of this research is in SD N Kartika Cluster, Sambong District, Blora Regency which consists of Brabowan State Elementary School 1, Brabowan State Elementary School 2, Brabowan State Elementary School 3, Biting State Elementary School 1, Biting State Elementary School 2, Gagakan State Elementary School 1, and Gagakan State Elementary School 2. The research time starts from planning in January-May 2024.

The population of this study is 133 students in Grade IV of the Kartika State Elementary School, Blora Regency. The sampling technique used proportional random sampling of 80% for 106 students. Data collection techniques use questionnaires, documentation, and interviews. The prerequisite test for analysis is using normality, linearity, and multicollinearity tests. Meanwhile, data analysis techniques with descriptive statistics, simple correlation analysis, multiple correlation analysis, F test, and determination coefficient.

Result and Discussion

This study involved three main variables, namely Parental Parenting (X1), Learning Independence (X2), and Science Learning Outcomes (Y) in Grade IV students of the Kartika Cluster State Elementary School, Blora Regency. The results of the research "The Relationship between Parenting Style and Learning Independence on Science Learning Outcomes Class IV of the Kartika Group State Elementary School in Blora Regency" are presented as follows:

Descriptive Analysis of Parenting Styles

Statistical data from questionnaire scores regarding Parenting Patterns in Grade IV students of the Kartika State Elementary School, Blora Regency. This data includes a minimum value of 56, a Maximum of 92, a Mean (average) of 77.62, and a Standard Deviation (Std. Dev) of 7.62. These scores have been arranged in a frequency distribution table with uniform class lengths. The data of the three parenting styles are summarized according to the number on each indicator and are presented as table 1.

Table 1. Frequency of Parenting Types

Types of Parenting	Sum	Percentage %
Authoritarian Parenting	16	15.10
Permissive Parenting	69	65.10
Democratic Parenting	21	19.80
Sum	106	100

Field Data and SPPS 2024

In this study, the parenting style applied by parents to their children is divided into three main categories: authoritarian, permissive, and democratic. Authoritarian parenting was implemented by 16 parents, representing 15.10% of the total respondents. This parenting style is characterized by strict control, high discipline, and expectations of unquestioned obedience from children. In contrast, permissive parenting, which was applied by 69 parents or 65.10% of the total respondents, gave children great freedom with few rules and discipline. Parents in this category tend to be more tolerant and avoid confrontation. Meanwhile, democratic parenting, which was implemented by 21 parents or 19.80% of the total respondents, combines structure with flexibility, where parents set boundaries but also gives children the freedom to discuss and participate in decision-making.

Descriptive Analysis of Learning Independence

The data obtained a minimum score of 57, Maximum of 93, Mean (average) of 77.70, and Deviation Standard of 7.78. Of the total 106 samples, there were 0 students (0%) who received the very good category, 69 students (65%) who received the good category, and 37 students (35%) who received the fairly good category. The average score of the student Learning Independence questionnaire was 78, so it was concluded that the Learning Independence of Grade IV students of the Kartika State Elementary School in Blora Regency was included in the good category.

Descriptive Analysis of Science Learning Outcome Variables

Data on science learning outcomes for Grade IV students of the Kartika State Elementary School in Blora Regency was obtained from the pure score of PAS Odd Semester. Based on the data on the Minimum Score of Science Learning Outcomes for Grade IV students of the Kartika State Elementary School in Blora Regency is 53, while the Maximum score is 90. The average (Mean) of Science Learning Outcomes obtained was 74.10, with a Standard Deviation (Std. Dev) of 7.86. The results of science scores are associated with the parenting style received by students and are presented as follows:

Table 2. The Relationship between Types of Parenting and Science Values

Parenting	Sum	Average Science Values
Authoritarian Parenting	16	73.55
Permissive Parenting	69	74.28
Democratic Parenting	21	74.71
Sum	106	

Field Data and SPPS 2024

This study looked for the relationship between the type of parenting style and the value of Science (Natural Sciences) in Grade IV students of the Kartika Cluster State Elementary School, Blora Regency. The data showed the distribution of the number of students based on the type of parenting: Authoritarian Parenting with 16 students (15.1%), Permissive Parenting with 69 students (65.1%), and Democratic Parenting with 21 students (19.8%). The average IPA score for each parenting style was 73.55 for Authoritarian Parenting, 74.28 for Permissive Parenting, and 74.71 for Democratic Parenting. These results provide an idea that students with Democratic Parenting tend to have a slightly higher average science score compared to students who receive parenting with Authoritarian Parenting or Permissive Parenting.

Analysis Prerequisite Test
Normality Test

The analysis used was the Kolmogorov-Smirnov Test using SPSS version 22. The conclusion is drawn based on a significant value (sig). The test results are as follows:

Table 3. Data Normality Test Results

Variable	Sig Value.	Result	Information
X1 Parenting	0.05	0.167	Usual
X2 Learning Independence	0.05	0.200	Usual
Y Learning Outcomes	0.05	0.200	Usual

Field Data and SPPS 2024

The results of the normality test of the value of the Sig data of Parenting Pattern (X1) were 0.16, Learning Independence (X2) was 0.20 and learning outcomes (Y) were 0.20. The results show that each variable has a significance value greater than 0.05, then the data of the three variables are declared to be normally distributed.

Linearity Test

The linearity test was carried out using the SPSS version 22 program with calculations using the Test for Linearity at a significance level of 0.05. The test criterion is that if the significance value on Deviation from Linearity is more than 0.05, then the relationship between variables is declared linear. Based on the results

of calculations using the SPSS version 22 program, the linearity test data was obtained as follows:

Table 4. Linearity Test Results

Variable	Sig Value.	Result	Information
X1 to Y	0.05	0.22	Linear
X2 to Y	0.05	0.16	Linear

Field Data and SPPS 2024

Based on the data, the significance value of the variables of Parenting and Learning Independence on Science Learning Outcomes in the Sig. column in the Deviation from Linearity row respectively is 0.22 and 0.168 or greater than 0.05. Thus, it can be concluded that the relationship between Parenting and Learning Independence on Science Learning Outcomes is linear.

Multicollinearity Test

Multicollinearity test to find out whether there is a relationship (correlation) between independent variables. The prerequisite that must be met is the absence of multicollinearity. The multicollinearity test in this study uses the SPSS version 22 program. To find out whether there is multicollinearity, look at the VIF (Variance Inflation Factor) and tolerance values. The test criteria are if the VIF value is < 10 and the tolerance is more than 0.1, then it can be concluded that there is no multicollinearity between independent variables. Based on the results of calculations using the SPSS version 22 program, the following multicollinearity test data were obtained:

Table 5. Multicollinearity Test Results

Variable	Tole Rance	VIF	Information
X1 (Parenting) and X2 (Learning Independence)	0.11	8.86	Does not happen Multicollinearity

Field Data and SPPS 2024

Based on the data, the Variance Inflation Factor (VIF) value for the variables of Parenting and Learning Independence is 8.86 (8.86 < 10) and the Tolerance value is 0.113 (0.11 > 0.10). Therefore, it can be concluded that there is no multicollinearity between independent variables. The data on the results of the multicollinearity test can be seen in the appendix.

Final Data Analysis

Simple and Multiple Correlation Analysis

Simple correlation analysis to test the hypothesis in this study uses the Pearson product moment correlation formula assisted by the SPSS version 22 program. This test compares the significance and $r_{\_count}$ values with a significance level of 5%. The calculation of the degree of freedom (df) is carried out with the formula df = n – 2, which is 106 – 2 = 104, so that a $r_{\_table}$ value of 0.19 is obtained. The alternative hypothesis (Ha) is accepted if $r_{\_count} > r_{\_table}$ and rejected if $r_{\_count} < r_{\_table}$. In addition, if the significance value (2-tailed) is less than 0.05, then the relationship can be said to be significant. The direction of the correlation relationship is indicated by the correlation value, where the positive value indicates a unidirectional relationship and the negative value indicates the opposite relationship. The strength or weakness of the relationship is determined based on the interpretation of the correlation coefficient. The results of the calculation of simple and multiple correlation analysis are presented in table 6.

Table 6. Correlation Results

Variable	Result Correlation	Range Correlation	Information
X1 to Y	0.84	0.80 – 1.00	Strong
X2 to Y	0.83	0.80 – 1.00	Strong
X1 and X2 to Y	0.85	0.80 – 1.00	Strong

Field Data and SPPS 2024

Test the correlation of variables of Parenting Styles with Science Learning Outcomes to test the acceptance of the hypothesis proposed as follows:

Ha_1: there is a relationship between Parenting Patterns and Science Learning Outcomes Class IV of the Kartika Cluster State Elementary School, Blora Regency. Ha_2: there is a relationship between Learning Independence and Science Learning Outcomes Class IV of the Kartika Cluster State Elementary School, Blora Regency; Ha_3: there is a relationship between Parenting Pattern and Learning Independence together on Science Learning Outcomes of Grade IV students of the Kartika Cluster State Elementary School, Blora Regency.

A simple correlation between Parenting Patterns and Science Learning Outcomes showed a r_hitung value of 0.84. This value is positive, indicating that the relationship that occurs is unidirectional; That is, the better the parenting style, the better the student's science learning outcomes. The magnitude of the correlation coefficient of 0.84 is included in the strong category, in the range of 0.80 – 1. A r_hitung value greater than r_tabel (0.84 > 0.19) indicates that Ha1 is accepted. At the significance level of 5%, a significance value of 0.000 (0.000 < 0.05) was obtained, so the correlation was said to be significant. Based on these calculations, it can be concluded that Ha1 is accepted, namely there is a positive and significant relationship between Parental Parenting and Science Learning Outcomes of Grade IV students of the Kartika Cluster State Elementary School, Blora Regency. The correlation between Learning Independence and Science Learning Outcomes showed a $r_{\_count}$ value of 0.84.

This value is positive, indicating that the relationship that occurs is unidirectional; that is, the better the Learning Independence, the better the student's Science Learning Outcomes. The magnitude of the correlation coefficient of 0.84 is included in the strong category, in the range of 0.80– 1. A $r_{\_count}$ value greater than $r_{\_table}$ (0.84 > 0.19) indicates that Ha_2 is accepted. At the significance level of 5%, a significance value of 0.000 (0.000 < 0.05) was obtained, so the correlation was said to be significant. Based on these calculations, it can be concluded that Ha2 is accepted, namely there is a positive and significant relationship between Learning Independence and Science Learning Outcomes of Grade IV students of the Kartika State Elementary School, Blora Regency.

The correlation between Parenting Pattern and Learning Independence on Science Learning outcomes showed a calculated value of 0.85. The results of the calculation show a positive number, indicating that the relationship that occurs is positive or unidirectional. This means that the better the Parenting Style and Learning Independence, the higher the students' Science Learning Outcomes. The calculation value of 0.85 is included in the strong category, which is in the range of 0.80 – 1.00. The value of the calculation greater than the $r_{\_table}$, which is 0.85 > 0.19, indicates that Ha_3 is accepted. Thus, it can be concluded that there is a positive relationship between Parenting and Learning Independence together on the Science Learning Outcomes of Grade IV students of the Kartika Cluster State Elementary School, Blora Regency. The data from the double correlation test results can be seen in the attachment.

Test F (Significance)

The F test is used to determine whether the variables X1 and X2 together have a significant effect on the variable Y in multiple regression analysis. The results of the F test can be seen in the ANOVA output of the analysis. The criterion used in the F test is that if the value of $F_{\_count}$ is greater than the value of F_t_{able}, then the coefficient of double correlation is considered significant.

Table 7. Test Result F (Significant)

Variable	Value F Table	Calculate F Value	Information
X1 and X2 against Y	3.08	140.08	There is a relationship signifikan

Field Data and SPPS 2024

Based on this data, the value of $F_{\_count}$ is 140.084. Meanwhile, in the statistical table for the significance level of 5%, with df1 = (number of variables – 1) = 3 – 1 = 2 and df2 = n – k – 1 = 106 - 2 - 1 = 103, the F_{table} value of 3.08 was obtained. Thus, since $F_{\_count}$ (140.084) is greater than $F_{\_table}$ (3.08), it shows that the double correlation is statistically significant and applicable to the entire population. It was concluded that there was a significant relationship between Parenting and Learning Independence together with Science Learning Outcomes of Grade IV students of the Kartika State Elementary School, Blora Regency. The data of the F test results can be seen in the attachment.

Coefficient of Determination Test

The Coefficient of Determination is a value used to show the percentage contribution of the independent variable to the bound variable. Determinant testing was carried out using the SPSS version 22 program, where the result on R Square was multiplied by 100%. The results of the determination coefficient test for the Parent Parenting Pattern variable (X1) on Science Learning Outcomes (Y), and the Learning Independence variable (X2) on Science Learning Outcomes (Y) together are as follows:

Table 8. Determination Test Results

Variable	Determination	Percentage
X1 to Y	0.71	71.50
X2 to Y	0.70	70.40
X1 and X2 to Y	0.73	73.10

Field Data and SPPS 2024

Based on the data, the R Square (R2) value of 0.71 multiplied by 100% yields 71.50%. This shows that Parenting Styles contribute 71.50% to the variation in Science Learning Outcomes, while the remaining 28.5% is influenced by other factors that were not investigated in this study. The R Square (R2) value of 0.70 multiplied by 100% yields 70.80%. This indicates that Learning Independence contributes 70.80% to the variation in Science Learning Outcomes, while the remaining 29.20% is influenced by other factors that were not investigated in this study. An R2 value of 0.73 multiplied by 100% yields 73.10%. This indicates that Parenting Patterns and Learning Independence together contribute 73.10% to the variation in Science Learning Outcomes, while the remaining 26.90% is influenced by other factors not investigated in this study.

Discussion

The Relationship between Parenting and Science Learning Outcomes

In this study, the parenting style applied by parents to their children reflects variations in parenting approaches, namely authoritarian, permissive, and democratic. Authoritarian parenting, implemented by

16 parents (15.10% of the total respondents), highlights strict control and high expectations of children's compliance. On the other hand, this approach often provides a clear and consistent structure for children, facilitating the formation of strong discipline as well as the reinforcement of social norms that are considered important. Children in this kind of environment tend to develop a good understanding of obligations, rules, and responsibilities, as they are guided to be obedient without much room for bargaining or negotiation. However, the downside is the lack of opportunities for children to develop adequate social skills in interacting and cooperating with others. Authoritarian parenting can limit children's initiative and creativity because their decisions are often not considered or discussed openly (Kuppens & Ceulemans, 2019).

This can hinder children's ability to learn to solve problems independently or take responsibility for their own decisions in the future (Ke, 2023); (Maker et al., 2023). On the other hand, permissive parenting, which was implemented by the majority of respondents (65.10%), offers more freedom to children with fewer rules and strict discipline. On the plus side, this approach allows children to explore and develop their own creativity and initiative. Children who grow up in these environments often have warm and open relationships with their parents, as they feel more accepted and valued for expressing themselves in the way they choose. However, the downside is the risk of a lack of clear boundaries for children's behavior. Permissive parenting can lead to difficulties in managing emotions and facing limitations or failures, as they may not be used to learning experiences from consequences or responsibilities. In addition, excessive freedom can confuse children about the expectations expected of them in a social and academic context. Meanwhile, democratic parenting, implemented by 21 parents (19.80%), combines structure with flexibility, where boundaries are set but provide space for the child's participation in decision-making.

On the other hand, this approach facilitates important social learning for children, such as negotiation skills, cooperation, and responsibility in decision-making. Children in democratic environments often feel more heard and involved in the family process, which can increase their motivation to learn and actively participate in family life. However, the downside is the challenge of reaching consensus in certain situations, which can result in ambiguity in the rules or family expectations. Children's involvement in decision-making can also take longer and require patience and effective communication from parents. In addition, in contexts outside the family, children accustomed to democratic parenting may have difficulty in dealing with more assertive authorities or structures at school or in other social settings (Malek et al., 2021); (Riyad et al., 2021). A simple correlation between Parenting Patterns and Science Learning Outcomes of grade IV students of the Kartika State Elementary School in Blora Regency showed a $r_{\_count}$ value of 0.846, which showed a positive and significant relationship between the two. This means that the better the parenting style, the better the students' science learning outcomes. This strong correlation coefficient (0.84) shows that Parenting Style has a great influence on students' science learning outcomes.

A $r_{\_count}$ value greater than $r_{\_table}$ (0.84 > 0.19) at a significance level of 5% confirms that H_a is accepted, so the relationship can be considered statistically significant. In addition, the $R_{\_Square}$ (R2) value of 0.71 shows that Parenting Styles contribute 71.50% to the variation in students' Science Learning Outcomes. This indicates that the Parenting Factor has a dominant role in explaining the variation in science learning outcomes, while the remaining 28.50% is influenced by other factors that were not studied in this study. The implication of these findings is the importance of the role of parents in supporting their children's learning, with adequate parenting can improve students' academic achievement at the primary school level. Research that is in line with these results is a study by (Stern & Hertel, 2022) showing that parental involvement has a significant direct effect on student learning success through metacognitive strategies in multiple multilevel mediation analysis. A supportive family environment is shown to improve students' academic achievement, while parental involvement also provides mental support that is important for their development.

The Relationship between Learning Independence and Student Science Learning Outcomes

In this study, the level of learning independence of grade IV students at the Kartika State Elementary School, Blora Regency was explored through several key indicators, namely having a desire to compete for progress, initiative, confidence, and responsibility. The results showed that the majority of students showed a good level of independence in both indicators. In particular, in the indicator of having a competitive desire to advance, most students (62% of the total respondents) showed high independence by obtaining a good to excellent category. As many as 3% of students obtained the highest scores and were classified as excellent, demonstrating a strong motivation to improve in their learning process. These findings underscore the importance of internal motivation in influencing student learning achievement. On the other hand, the initiative indicators also showed satisfactory results, where most students (54% of the total respondents) obtained the good to excellent category. Nonetheless, 8% of students

still obtained a category lacking in initiative, indicating that a small percentage of them needed further guidance to develop the ability to take early steps in learning (Avila Cruz et al., 2022). These findings provide important insights into students' ability to take their own initiative in the learning process, which is a crucial aspect in the development of learning independence. Based on the correlation analysis between Learning Independence and Science Learning Outcomes, it was found that there was a strong positive relationship between the two variables.

A r_{count} score of 0.84 indicates that the higher the level of student learning independence, the better their learning outcomes in science. This result was significant at a significance level of 5%, suggesting that the observed correlation did not occur by chance. Thus, it can be concluded that learning independence has a significant role in influencing the learning outcomes of science students in grade IV at the Kartika Cluster State Elementary School, Blora Regency. The R_{square} (R2) value of 70.8% shows that variability in science learning outcomes can be explained by the level of student learning independence, while the remaining 29.20% is influenced by other factors that were not studied in this study. This underscores the importance of developing learning independence in an effort to improve students' academic achievement in elementary school..The research that is in line with these results is a study by (Laila & Utomo, 2024) examining learning independence and student learning outcomes in the context of online learning in elementary schools. This research uses a literature analysis method by collecting articles, journals, and books that are relevant to the research topic. The main findings of this study show that learning independence has a crucial role in determining student success in learning (Amin Harahap, 2024); (Scolobig et al., 2024). Learning independence is considered important for every student who wants to achieve good academic achievements. Learning independence affects student learning outcomes because these results are used as assessments by teachers to evaluate students' understanding of the material taught during learning.

The Relationship between Parenting and Learning Independence with Student Learning Outcomes

The relationship between parenting and learning independence on students' science learning outcomes highlights the importance of dynamics in family settings on children's academic development. Authoritarian parenting, while offering a clear structure, tends to limit independent learning exploration and initiative, which can affect students' learning independence. On the other hand, permissive parenting that provides less boundaries can reduce the urge to develop consistent learning disciplines (Andrews et al., 2024); (Nerantzi, 2019). In contrast, democratic parenting that blends structure with student involvement in decision-making can facilitate the development of healthy learning independence. Learning independence, including the ability to self-regulate, take initiative, and take responsibility for the learning process, plays a crucial role in improving science learning outcomes. Students who have high learning independence tend to be more effective in utilizing available learning resources and solving problems independently (Az Zahro et al., 2022); (Wulandary et al., 2023).

Thus, parenting approaches that support learning independence, such as democratic parenting, may be more effective in preparing students to achieve better academic achievement, including in science subjects in educational settings (Bachri et al., 2023).The results of the study on grade IV students at the Gugus Kartika State Elementary School, Blora Regency, found that the majority of students showed a good level of learning independence in the aspect of having a desire to compete for progress, initiative, confidence, and responsibility. This illustrates the students' solid commitment to improving the quality of their learning. Nonetheless, there is a small percentage of students who need additional guidance to increase their confidence and responsibility levels. Based on data obtained from research on grade IV students at Gugus Kartika State Elementary School, Blora Regency, it can be concluded that in terms of the average science score, students with Democratic Parenting (74.71) show a slightly higher average score compared to Permissive Parenting (74.28) and Authoritarian Parenting (73.55).

However, to conclude the absolute best parenting style, it is also necessary to consider other factors such as learning independence and other non-academic factors that may also affect student learning outcomes. Furthermore, the results of the analysis showed that there was a positive and significant correlation between the variables of Parental Parenting, Learning Independence, and Student Science Learning Outcomes (Moh Ghoizi Eriyanto et al., 2021). This correlation was measured with a r_{count} value of 0.855, which belongs to the strong category (0.80 – 1.00), and greater than the relevant r_{table} value (0.19). These results show that the better the Parenting Style and Learning Independence, the higher the students' Science Learning Outcomes. With a significance level of 5%, these findings confirm that the observed association did not occur by chance. These results underscore the crucial role of parents in supporting their children's learning independence. Effective coaching strategies in increasing students' learning independence in an educational environment will contribute significantly to their academic achievement (Avila Cruz et al., 2022). Overall, this study not only identifies the factors that affect students'

learning independence, but also highlights the importance of the integration between parental support and fostering learning independence in schools. The results show that Parenting, especially democratic ones, can play an important role in creating an educational environment that supports better academic achievement for students (Hanaysha et al., 2023).

In addition, the analysis of the determination value of 0.73 showed that Parenting Pattern and Learning Independence together contributed 73.10% to the variation in students' Science Learning Outcomes. The rest, 26.9%, was influenced by other factors that were not studied in this study. This illustrates the extent to which the variables studied can explain the variation in student learning outcomes at the Kartika Cluster State Elementary School, Blora Regency. As such, these findings provide a solid foundation for the development of better educational policies and practices, with a focus on strengthening the role of parents and fostering students' learning independence to improve overall academic achievement. Research that goes hand in hand with this study is research by (Kantova, 2024); (Naite, 2021) highlighting the important role of parental involvement in influencing students' social and academic outcomes. The findings of the study show that the active involvement of parents and families has a significant positive impact in improving students' academic achievement (Lara & Saracostti, 2019).

Conclusion

Based on the results of the research and discussion, this study can be concluded as follows: There is a positive and significant correlation between parental parenting and science learning outcomes of Grade IV students at the Kartika Cluster State Elementary School, Blora Regency. At a significance level of 5%, the calculated value of 0.84 exceeded the table value of 0.19, so that Ha1 was acceptable. It can be concluded that parental parenting contributes significantly to student learning outcomes, with this parenting style influencing 71.50%, while the remaining 28.5% is influenced by other factors; There is a positive and significant relationship between learning motivation and science learning outcomes of Class IV students at the Kartika Cluster State Elementary School, Blora Regency. At a significance level of 5%, the calculated value of 0.841 exceeded the table value of 0.19, so that Ha_2 was acceptable. In conclusion, learning independence contributes significantly to student learning outcomes, with an influence rate of 70.80%, while the remaining 29.20% is influenced by other factors; There is a positive and significant relationship between parenting and learning independence together with the learning outcomes of science students in Grade IV at the Kartika State Elementary School, Blora Regency. At a significance level of 5%, the calculated value of 0.85 exceeded the table value of 0.19, so that Ha3 was acceptable. It can be concluded that parenting and learning independence together make a significant contribution to student learning outcomes, with an influence rate of 73.10%, while the remaining 26.90% are influenced by other factors.

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