

THE RELATIONSHIP BETWEEN LEARNING INDEPENDENCE AND PISA TEST RESULT SCORES

Deyjan Ahsan Nur Rijal¹, Dini Fitriani²

¹ SMA Budi Bakti 2 Cianjur, Indonesia
danrijal24@gmail.com

² SMP Plus Nurul Hidayah Pasundan Cianjur, Indonesia
fitrianiidini612@gmail.com

Article Info

Article History

Received: 10-02-2023

Revised: 8-03-2023

Accepted: 15-03-2023

Keywords

Correlation;
Learning Independence;
PISA Test Questions;
Regression

Corresponding Author

Dini Fitriani,
SMP Plus Nurul Hidayah
Pasundan
Cianjur, Indonesia
Fitrianiidini612@gmail.com

Abstract

Mathematics is a mandatory subject that students need to master, but many still think it is not related to life. This is evidenced by the fact that Indonesia's PISA score is below the average. The test results themselves are usually related to and can be influenced by learning discipline that coincides with learning independence, but can learning independence alone have a significant effect on test results. This study aims to see a relationship between learning independence and the results of the PISA test at SMP Plus Nurul Hidayah Pasundan. This was done by collecting data in the form of PISA test results and self-learning questionnaires. With several tests carried out, it is proven that independent learning can influence the results of the PISA test questions with a significance value of 0.000011335039557777 with the interpretation that there is a positive and significant relationship. The strength of the influence caused by independent learning is at 78.4%, meaning that independent learning greatly influences the results of the PISA test questions.

How to Cite:

Rijal, D. A. N., & Fitriani, D. (2023). The relationship between learning independence and PISA test result scores. *Pi-Radian Journal*, 1(1), 11-24.

INTRODUCTION

Learning is the process of transferring knowledge from people who are already proficient to people who need the knowledge. Learning is a knowledge transfer process that involves systems in the world of education, namely: teachers/educators, students, materials, goals and tools (Kurniawati, 2021). With learning, it is hoped that there will be no ignorance on this earth, especially in Indonesia. Indonesia is in the low category in intelligence in mathematics learning.

Mathematics is a learning that is included in the required level or is a compulsory subject taught in the education system in Indonesia. Mathematics is one of the main subjects in every level of education such as primary education, secondary education and higher education Wilson (Kuncoroningsih, 2013) So is it mentioned in the analysis conducted by

Malikah et al. (2022) In the curriculum structure there are several compulsory learnings including mathematics learning, the allocation of time has not changed as much as 180 hours per year.

There are still many students who do not feel challenged to learn mathematics. Even though students are expected to have skills in all aspects of the lesson, including mathematics learning itself, in accordance with the research that has been done (Aledya, 2019; Maula et al., 2018) Mathematics is considered a difficult material and has no benefit in everyday life. Perhaps because rarely, anyone knows what the relationship of mathematics is in life, the assumption of learning mathematics seems to be ruled out.

Mathematics is also usually used as a benchmark for the intelligence of a student. Mathematics is the queen of science, has an important role in the world of education, because it is a basic science that trains the ability to count and think critically of students. So it is not uncommon for a person's intelligence benchmark to be seen from mathematics lessons (Basuki, 2015; Maulidya & Nugraheni, 2021)

To find out students' proficiency in mathematics, of course, this can be done using various assessment methods, one of which is the PISA test questions. PISA itself stands for the Program for International Student Assessment organized by an initiation called OECD. The acquisition of Indonesia with the PISA Test is launched from the website OECD (2018) in 2018, Indonesia obtained an average of 374, far from the average PISA test score by the OECD, which was 492 for men.

From Indonesia's low ranking, of course, there will be a lot of influence in this achievement, one of which can be caused by learning discipline and learning independence. Learning discipline is a condition that is created and formed through the process of effort made by a person to obtain a new change in behavior as a whole, as a result of his own experience in interaction with his environment that shows the values of obedience, docility, faithfulness, order, and peace (Purbianto & Rustiana, 2018).

In addition to learning discipline, learning independence must also be possessed by students to improve their learning outcomes. The relationship between learning disciplines also affects learning independence, such as research conducted by Puspitasari & Sutriyono (2018) explained that learning discipline and learning independence together have an influence on improving mathematics learning achievement. Contrary to the previous opinion (Ramadona & Yusri, 2019; Yuliawan & Nusantara, 2020) In their research mentioned that there is a relationship between learning discipline and learning independence. This means that learning discipline can affect the independence of learning owned by the students themselves.

The above statement makes a question whether only examining one aspect, namely learning independence, can be the key to achieving maximum learning outcomes, which has a significant influence. Of course, if we know the problems that occur in students to face learning, then we will get the solution. Included in this student learning independence, if student independence turns out to affect student learning outcomes, then the thing that must be improved is to increase learning independence, instill curiosity and a sense of responsibility that will have a positive impact on student survival.

Priyo (Artinta & Fauziah, 2021) High student curiosity in learner activities will have an impact on problem-solving skills. High student curiosity will have an impact on the learning outcomes of these students. Curiosity is a factor of learning independence, it is only one factor that is improved, so improvement in all aspects will have a positive impact on learning independence, after learning independence increases or is trained to be at a high level, it is possible that the learning results obtained are also high.

The problem of learning independence can be seen from the excessive use of gadgets in students while studying. With the gadgets they have make them lazy and not independent in learning, the tasks given by teachers are done using the gadgets they have, without opening books again. With gadgets and the internet makes it easier for them to find answers without having to try to find and study to find the answer. Addicted to using gadgets so that children spend more time using gadgets and children become lazy to move and move, events like this make children more spoiled with all the sophistication of these gadgets (Sapardi, 2018).

From the description above, it can be concluded that the factors that influence it are the lack of learning independence seen with the naked eye or without questionnaires and direct statements from the students studied. So, researchers are interested in conducting research on The Relationship Between Student Learning Independence and PISA Test Scores.

METHOD

This research is research that uses quantitative methods in it. Quantitative methods are research methods in which many numbers are used. Starting from the process of data collection to interpretation. According to Sugiyono (Imron, 2019) Quantitative data is a research method based on positivism (concrete data), research data in the form of numbers that will be measured using statistics as a calculation test tool, related to the problem under study to produce a conclusion.

The measurement process is central to quantitative research with the availability of fundamental connections between empirical observations and mathematical expressions of quantitative relationships. Researchers will usually perform data analysis with the help of statistics (Afif et al., 2023). The types of quantitative research methods are correlation, descriptive, comparative casual, experimental, survey, and inferential. Afif et al. (2023) The most common and frequently used quantitative research methods are correlation, descriptive, causal comparative, comparative, experimental, survey, and inferential.

The quantitative method used in this study is correlation. Correlational research is research used to measure how closely related or influential (correlation) between independent variables and dependent variables. According to Ruseffendi (2012) Correlation is a relationship or relationship between two variables, either a positive correlation (the greater the value of one modifier, the greater the value of the other variable) or a negative correlation. From this statement, it is stated that correlation has three directions, namely positive correlation (not negative and not zero), negative correlation (not positive and not zero), and also zero or uncorrelated correlation (neither positive nor negative).

The data collection carried out in this study was by using questionnaire data as an indicator of student learning independence assessment and also using test questions as an indicator of students' ability to do the questions. The questionnaire used in this study was adopted from the thesis (Wulandari, 2022) Titled Analisis Kemandirian Belajar pada Pembelajaran Matematika Siswa Kelas VIII UPTD SMP Negeri 23 Barru. This questionnaire consists of 8 indicators, namely: learning initiative, diagnosing learning needs, setting learning goals, viewing learning difficulties as challenges, finding relevant sources, setting learning strategies, evaluating learning outcomes, and self-confidence, each indicator contains 3 statements including positive and negative. It can be clearly seen in detail the division of statements according to aspects in the table below.

Table 1. Distribution of statements according to aspects in the learning independence questionnaire

No	Aspects	Question items
1	Learning initiatives	1, 2, 3
2	Diagnosing learning needs	4, 5, 6
3	Setting learning goals	7, 8, 9
4	Viewing learning difficulties as challenges	10, 11, 12
5	Search for relevant sources	13, 14, 15
6	Establish a learning strategy	16, 17, 18
7	Evaluate learning outcomes	19, 20, 21
8	Confidence	22, 23, 24, 25

This learning independence questionnaire contains 4 scales, namely: SS=*Sangat Setuju* (Totally Agree), S=*Setuju* (Agree), TS=*Tidak Setuju* (Disagree), and STS=*Sangat Tidak Setuju* (Strongly Disagree). Given 4 scales because they are adjusted to the referenced source, also so that there are no doubtful or cannot be assessed answers that are in the middle, or also minimize student confusion rather than being faced with a scale of more than 4 or even up to 10.

In addition to using questionnaires as a benchmark to determine student learning independence, instruments are also needed to measure PISA test results. The results of the PISA question test are students' proficiency in doing the questions. The PISA questions shared contain 10 questions that have different weights. Then, the PISA test results in this study are a set of questions that can be accessed on the OECD website. The questions used are documents or archives about PISA used in 2012.

In this study, the variables studied were student learning independence and PISA test results. Learning independence itself means a sense of responsibility in learning without having to rely too much on others in learning. In accordance with the opinions expressed (Dewi et al., 2020) Learning independence is an attitude that a person has in the process of self-learning to achieve goals where a person contributes actively to the learning process by not depending on others. The subjects in this study were students of SMP Plus Nurul Hidayah Pasundan, one of the high schools in Cianjur Regency.

Table 2. Qualitative Score Conversion Guidelines

Score Interval	Criterion
$\bar{x} > Mi + 1,8 Sbi$	Excellent
$Mi + 0,6 Sbi < \bar{x} \leq Mi + 1,8 Sbi$	Good

$Mi - 0,6 Sbi < \bar{x} \leq Mi + 0,6 Sbi$	Enough
$Mi - 1,8 Sbi < \bar{x} < Mi - 0,6 Sbi$	Less
$\bar{x} \leq Mi - 1,8 Sbi$	Very lacking

Information:

Mi = Ideal average = $\frac{1}{2}$ (Ideal maximum score + Ideal minimum score)

Sbi = Standard deviation = $\frac{1}{6}$ (Ideal maximum score – Ideal minimum score)

Ideal maximum score = Highest score

Ideal minimum score = Lowest score

Quoted from Widyoko (Firstananda, 2015)

Table 3. Test question scoring criteria

Percentage (%)	Category
85-100	Very High
69-84	High
53-68	Enough
37-52	Low
≤ 36	Very Low

Source: Eka (Wulandari, 2022).

RESULTS AND DISCUSSION

This study aims to answer this research question itself, namely whether there is a relationship between student learning discipline and PISA test results. The results of students' PISA test questions are in the high category according to the assessment of the test questions, and learning independence is in the sufficient category. The difference in categories of the two variables studied in this study does not make the two variables opposite each other or not one way. With the correlation test, it can be seen that there is a relationship between the two variables by showing a significance value or probability less than α (0.05) which shows a significant relationship.

In this study, the variable studied is the relationship between learning independence and the results of the PISA question test, thus it will produce a hypothesis (H_0 dan H_1). H_0 itself is described by the absence of a relationship between student learning independence and PISA test results. H_1 is the opposite statement of H_0 . From the research conducted, data were obtained from these two variables, namely learning independence data obtained from questionnaire results distributed to students and PISA question test result data obtained from test results that were also distributed to students.

The questionnaire used in this study contained 25 statements with four responses (strongly agree, agree, disagree, and strongly disagree). Where the 25 statements are divided into 8 aspects including learning initiative, diagnosing learning needs, setting learning goals, viewing learning difficulties as a challenge, finding relevant sources, setting learning strategies, evaluating learning outcomes, and confidence. From the questionnaires that have been distributed and done by the students, obtained and summarized with the frequency table as follows:

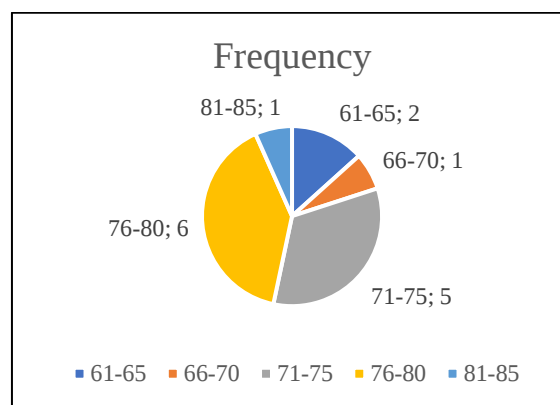


Figure 1. Frequency Diagram of Student Learning Independence Questionnaire Results

From the table it can be seen that the most student independence is in the value interval of 76-80. Meanwhile, when viewed from each indicator in the questionnaire and then processed using a qualitative conversion formula, the results will also be obtained as follows:

Table 3. Percentage of questionnaire results for each indicator

Indicators	Average Percentage	Category
Learning Initiatives	76,67%	Enough
Diagnosing Learning Needs	77,78%	Good
Setting learning goals	72,78%	Enough
Viewing adversity as a challenge	72,22%	Enough
Search for relevant sources	65,55%	Less
Establish a learning strategy	68%	Less
Evaluate learning outcomes	80%	Good
Confidence	75,41%	Enough
Average	73,59%	Enough

The average obtained from the results of the questionnaire that has been given to students is 73.59%, if referring to the Qualitative Score Conversion Guidelines, the value of 73.59% is in the Sufficient category. So, it can be concluded that the learning independence possessed by students is in the Sufficient category.

The data that has been collected can be seen how the level of learning independence from the 8 indicators contained has various results including less, sufficient, and good. Student learning independence is in the Sufficient category. However, if you look at the value gain per indicator, then the lowest indicator is the indicator looking for relevant sources.

In the discussion above, it shows that students in junior high schools studied have a category of Less to find relevant sources, where students seem not to look back for a material taught by the teacher and swallowed raw what is taught by the teacher. As suggested in the study Kamulyan & Primasari (2016) Students have to walk a long way when looking for learning resources, difficulties in finding books, books that are less interesting, become rarely used by students to learn. The statement is if students are expected to search for sources manually such as to libraries and others. As for according to Anggriani (2020) Children prefer to play gadgets rather than looking for learning

materials because many parents let their children play gadgets without supervision and are left to do other activities.

According to the opinion above, it is concluded that students tend to be lazy when they have to find resources without gadgets, while when using gadgets students are even engrossed in playing because of lack of supervision from parents. Students' interest in learning about indicators of lack of finding relevant sources can also be proven by questions and answers conducted to students that students seem to forget the material even though it was only delivered at the previous meeting.

In addition to the low percentage gain, the highest questionnaire was also seen, namely in the indicator about evaluating learning outcomes. In this indicator, dominant students answered in the affirmative and strongly agreed with the statement explaining that students would be happy if they got good grades. From these results, it can be concluded that the students in this class are students who prioritize results rather than the process they take. They feel unhappy when their grades are poor, but beyond that they are also a little lacking in researching relevant sources. The acquisition of scores from questionnaires with indicators evaluating learning outcomes is in the good category. The above explanation is supported by opinions Nurhayati et al. (2016) They (students) want good grades, but they don't care what process they should go through, but to be able to get good grades they should study first.

For the PISA question test itself, 10 test questions are given, where each of these questions has a different weight, with easy, medium, and high categories according to the direction of the teacher who has been interviewed to help determine the weight of the question. The students' achievements in the PISA question test distributed are as follows:

Table 4. Percentage of Score Obtained for Each PISA Question Item

Question Tile	Number	Question Type	Average student working (%)	Category
Which Car	1	Medium	87	Very High
	2	Easy	80	High
	3	Medium	87	Very High
Memory Stick	4	Medium	87	Very High
	5	Hard	73	High
Garage	6	Easy	87	Very High
	7	Hard	67	Enough
	8	Medium	80	High
MP3 Player	9	Easy	80	High
	10	Hard	47	Low

From the table above, it can be seen that the highest score is not dominated by easy question types, but is a medium type of question. This can happen because students ignore easier questions or think they are easy, because the multiple-choice questions mostly do it arbitrarily or don't think anymore and there is not enough time to calculate difficult questions, according to Hendriana (Sari, 2020) Students give up easily in doing difficult questions and easily complain or despair in doing problems.

Questions have unbalanced proportions, for example multiple choice, so that it is too easy does not make students increase efforts to solve them (Anita et al., 2018). The highest percentage of easy questions is in question number 6 in the Very High category, this is because question number 6 is only multiple choice, which without thinking can be easily selected. Widayanti & Kolbi (2018) Students experience confusion, so students answer as long as they answer multiple choice which does not match the answer.

The explanation above means that choosing questions in a careless way can make the answers uncertain, can make many answers fooled or become many correct. The lowest percentage is obtained by number 10 which is also a difficult question, many students cannot solve question number 10 because they run out of time, other researchers have also experienced the same thing Layn & Kahar (2017) Most of the students do not solve the questions because students are confused about understanding the question commands and students run out of time in solving the questions. The scores obtained by students in doing 10 PISA questions can be seen in the graph below:

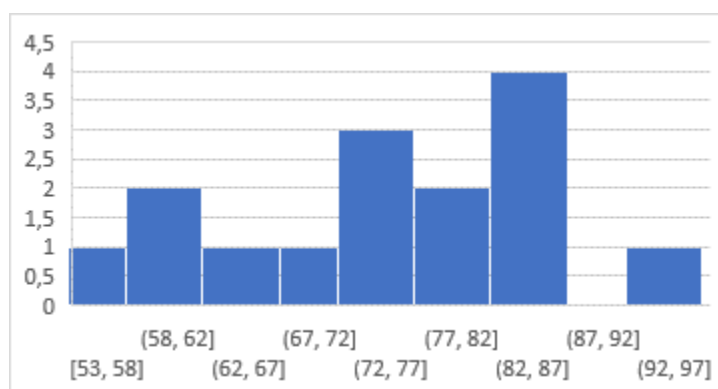


Figure 2. PISA Test Results Graph

It can be seen that most students get grades that range from 82 to 87 with a frequency of 4. The details can be seen in the table of obtaining PISA test scores according to the title of the question tested.

Table 6. Obtaining PISA Question Test Scores According to the Title of the Question Tested

Question Title	Percentage of many students who answered (%)	Category
Which Car	82,22	High
Memory Stick	53,33	Enough
Garage	70,00	High
MP3 Players	80,00	High
Average	71,39	High

If referring to the test scoring system put forward Eka (Wulandari, 2022) then there is a percentage of students who answer with the category Simply being on the question entitled Memory Stick. This question is the lowest percentage compared to the various question titles given. When viewed from the average percentage of students answering each question title, it can be concluded that the average score obtained by students is high.

Because the purpose of this study is to see if there is a relationship between learning independence and PISA test results, testing must be done gradually before conducting the last test, namely the correlational test. Furthermore, prerequisite tests are carried out before conducting correlational tests, namely normality tests, linearity tests, and correlation tests themselves using the SPSS application version 26.

Table 7. Normality Test

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PISA Test	.155	15	.200*	.947	15	.472
Learning Independence	.191	15	.146	.928	15	.256

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

From the calculation results to find out the data is normally distributed or not, using the SPSS application, it is obtained that the significance value for the PISA Test and Learning Independence is both greater than 0.05 with information that the data is normally distributed. Thus, the next thing to do is to do a linearity test.

Table 8. Anova Table for Measuring Linearity

		Sum of Squares	df	Mean Square	F	Sig.
Learning Independence * PISA test	Between Groups	435.583	7	62.226	6.071	.015
	Linearity	397.799	1	397.799	38.810	.000
	Deviation from Linearity	37.784	6	6.297	.614	.715
	Within Groups	71.750	7	10.250		
	Total	507.333	14			

A significance value of 0.715 was obtained. So, $0.715 > 0.05$ thus it can be concluded that there is a significant linear relationship between the two variables, namely learning independence and interest in learning from the class studied. Because the data above is normal and linear data, the pearson product moment correlational test is then carried out because it is parametric data.

Table 9. Pearson Correlation Test Table

Correlations		Learning Independence	PISA Test
Learning Independence	Pearson Correlation	1	.885**
	Sig. (2-tailed)		.000
	N	15	15
PISA Test	Pearson Correlation	.885**	1
	Sig. (2-tailed)	.000	
	N	15	15

** . Correlation is significant at the 0.01 level (2-tailed).

In table 9 above, it can be seen that the significance value presented in the table by looking at the Sig. (2-tailed) row and the column of learning independence and PISA tests shows 0.000. If you look at the actual value in the significance value is not purely a 0, but if you try to see the more numbers after the comma (,) using the Microsoft Excel application it will produce a lot of numbers, and these numbers if viewed far to 18 numbers after the comma are 0.000011335039557777, then the significance value is less than 0.05 thus the hypothesis H_0 Accepted with information that there is a relationship or both variables or correlated with each other.

Because the two variables have been seen to have a relationship, then a test is carried out to see how strong the relationship or influence between the two variables (the influence of the variable is tied to the independent variable) with the regression test. The results of the regression test carried out are presented in the table below:

Table 10. Regression Test Results

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	397.799	1	397.799	47.213	.000 ^b
Residual	109.534	13	8.426		
Total	507.333	14			

From the table above, it can be seen that the significance value of the regression test is a significance value of less than 0.05 (α), thus it can be concluded that, there is an influence caused by the dependent variable (learning independence) on the independent variable (PISA test score) in this study. So, even using correlational tests and regression tests of these two variables still show a relationship. As for seeing how strong the relationship or influence of the independent variable on the dependent variable can be seen in the following table:

Table 11. Test Results to Measure Determination

Model	R	R Square	Adjusted Square	RStd. Error of the Estimate
1	.885 ^a	.784	.767	2.90270

The table shows that the R value of 0.885 has the same value as the *Pearson Correlation* value found in table 9. To see the influence caused by the independent variable on the dependent variable can be seen in the *column R Square*. The column contains a number of 0.784, or it can be concluded that student learning independence has an influence on PISA test scores by 78.4%

Looking back at the significance value obtained from the correlational test, the relationship between learning independence and interest in learning itself has a positive direction, where the significance value obtained is clearly visible that the number is a positive number because it does not have a negative sign nor does it have an actual 0 (zero) value, the correlation is positive, then if high learning independence will coincide with high PISA test scores as well. The relationship between the two variables is also influenced by the strength of the correlation is large, so the increase will be very visible. If the independence of learning is high, of course, the test results of the PISA questions are also high.

The relationship between learning independence and PISA test results seems to have been in a positive relationship, in addition to looking for a relationship, this study also examined how much influence was caused, so testing was carried out with regression tests. Which is where learning independence has an influence on the results of the PISA question test. To measure how strong the effect is, a relatively high determination test is carried out.

Learning independence is an important aspect that must be possessed in students to support success in learning. The learning context that requires learning independence is not only fixed on the learning contained in this study, namely mathematics, but is needed for all other learning. This learning independence often has the support of aspects that are equally owned in a person, such as self-confidence, discipline, and many more that fill each student in order to achieve satisfactory results from the learning. Like the research done (Kurnia et al., 2018) which discusses that aspects in humans that go hand in hand will produce good results in this study, namely learning independence and self-efficacy of students' mathematical communication skills.

From the research that has been done, it can be presented that learning independence has an important effect (plays a role) for students to have satisfactory results. This is due to the role of the brain which if it has been stimulated in good conditions, then the process after giving the stimulus will run automatically making learning that there is no coercion and the knowledge conveyed will reach students, the results we can know for sure that have good results as well. Examples of giving good stimuli will have good results also are the learning concepts of children who are in PAUD or kindergarten, teachers will provide stimuli in the form of stimuli to children to always remain cheerful and happy so that children who participate in the learning will spontaneously be cheerful and happy too.

Good results obtained from the stimulus of good things can also even be found from things that are often done in everyday life. A small example is giving a smile every time we meet people, the results will be different if we hit or show a look that is not wearing when meeting people. Giving good things to produce good in accordance with research (Nurul Ichsan & Nasution, 2021) Good training will produce good work performance as well.

How students can have high PISA test scores, the question has been answered expressly from the description above. Students have high test scores even not only PISA tests can be obtained by developing aspects that are within students. The aspect in question includes learning independence, where in this study learning independence plays an important role even the influence resulting from this learning independence in obtaining PISA question test results is high.

CONCLUSION

Learning independence with PISA test results has a positive relationship after going through prerequisite tests to the Pearson correlation test. In addition to looking for a relationship or not between the two variables, it is also sought whether there is a significant influence and how much influence it has, with the conclusion that there is an influence of learning independence on the results of the PISA question test and also has a high influence. Students from one class have sufficient learning independence, with two indicators being the lowest and highest indicators. The lowest indicator is caused by

students being less independent in finding relevant sources for learning, be it manual sources or learning resources using gadgets. The highest indicator is due to the desire of students to have good grades, but from that students sometimes do not pay attention to the process and seem to just want to get good grades without struggling first. By conducting this research is expected to have positive results, both for the school studied and for readers and subsequent researchers. Schools will always know what is needed to support learning so that students can have optimal results, as well as readers and researchers who will simultaneously know what is needed. Especially for research that should be carried out in this school, the next is to conduct research that is developing or researching other aspects besides learning independence, and does not only include mathematics learning or specifically as in this study, namely the results of the PISA question test only.

REFERENCES

- Afif, Z., Azhari, D. S., Kustati, M., & Sepriyanti, N. (2023). Penelitian ilmiah (kuantitatif) beserta paradigma, pendekatan, asumsi dasar, karakteristik, metode analisis data dan outputnya. *INNOVATIVE: Journal Of Social Science Research*, 3(3), 682–693. <https://j-innovative.org/index.php/Innovative%0APenelitian>
- Aledya, V. (2019). Kemampuan pemahaman konsep matematika pada siswa. *Research Gate*, 2, 1–7.
- Anggriani, Y. (2020). Pemanfaatan gadget dalam meningkatkan minat baca anak di keluarga. *Jurnal Perpustakaan Universitas Airlangga: Media Informasi Dan Komunikasi Kepustakawanan*, 10(2), 138–147. <https://e-journal.unair.ac.id/JPERPUS/article/view/22996/13103>
- Anita, A., Tyowati, S., & Zuldafrial, Z. (2018). Analisis kualitas butir soal fisika kelas X Sekolah Menengah Atas. *Edukasi: Jurnal Pendidikan*, 16(1), 35. <https://doi.org/10.31571/edukasi.v16i1.780>
- Artinta, S. V., & Fauziah, H. N. (2021). Faktor yang mempengaruhi rasa ingin tahu dan kemampuan memecahkan masalah siswa pada mata pelajaran IPA SMP. *Jurnal Tadris IPA Indonesia*, 1(2), 210–218. <https://doi.org/10.21154/jtii.v1i2.153>
- Basuki, K. H. (2015). Pengaruh kecerdasan spiritual dan motivasi belajar terhadap prestasi belajar matematika. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 5(2), 120–133. <https://doi.org/10.30998/formatif.v5i2.332>
- Dewi, N., Asifa, S. N., & Zanthi, L. S. (2020). Pengaruh kemandirian belajar siswa terhadap hasil belajar matematika. *PHYTAGORAS: Jurnal Program Studi Pendidikan Matematika*, 9(1), 48–54. <https://doi.org/https://doi.org/10.33373/pythagoras.v9i1.2293>
- Firstananda. (2015). *Pengembangan perangkat pembelajaran matematika materi lingkaran dengan pendekatan guided discovery untuk siswa kelas VIII SMP* [Universitas Negeri Yogyakarta]. <https://eprints.uny.ac.id/20112/>
- Imron, I. (2019). Analisa pengaruh kualitas produk terhadap kepuasan konsumen menggunakan metode kuantitatif pada CV. Meubele Berkah Tangerang. *Indonesian Journal on Software Engineering (IJSE)*, 5(1), 19–28. <https://doi.org/10.31294/ijse.v5i1.5861>

- Kamulyan, M. S., & Primasari, F. (2016). Implementasi perpustakaan sekolah sebagai sumber belajar dalam meningkatkan prestasi belajar siswa. *Profesi Pendidikan Dasar*, 1(1), 17–30. <https://doi.org/10.23917/ppd.v1i1.1551>
- Kuncoroningsih, E. (2013). *Hubungan antara sikap siswa dalam pembelajaran matematika dengan prestasi belajar pada siswa kelas VIII SMP Negeri 2 Pabelan tahun ajaran 2012/2013* [Universitas Kristen Satya Wacana]. <https://repository.uksw.edu/handle/123456789/3634>
- Kurnia, R. D. M., Mulyani, I., Rohaeti, E. E., & Fitrianna, A. Y. (2018). Hubungan antara kemandirian belajar dan self efficacy terhadap kemampuan komunikasi matematis siswa SMK. *JIPMat*, 3(1), 59–64. <https://doi.org/10.26877/jipmat.v3i1.2183>
- Kurniawati, W. (2021). Bermain sebagai sarana pengembangan kreativitas anak usia dini. *Jurnal An-Nur: Kajian Pendidikan Dan Ilmu Keislaman*, 7(1), 1–10.
- Layn, R., & Kahar, S. (2017). Analisis kesalahan siswa dalam menyelesaikan soal cerita matematika. *Jurnal Math Educator Nusantara (JMEN)*, 03(02), 59–145.
- Ma'ruf, H. (2018). *Statistika Dasar untuk Penelitian*. Departemen Pendidikan dan Kebudayaan Direktorat Jenderal Pendidikan Tinggi.
- Malikah, S., Winarti, W., Ayuningsih, F., Nugroho, M. R., Sumardi, S., & Murtiyasa, B. (2022). Manajemen pembelajaran matematika pada kurikulum merdeka. *Edukatif: Jurnal Ilmu Pendidikan*, 4(4), 5912–5918. <https://doi.org/10.31004/edukatif.v4i4.3549>
- Maula, I., Setyaning Pambudi, A., & Rohmah, Z. (2018). Perkembangan matematika dalam sejarah peradaban islam. *Prosiding Konferensi Integrasi Interkoneksi Islam Dan Sains*, 1(1), 115–119.
- Maulidya, N. S., & Nugraheni, E. A. (2021). Analisis hasil belajar matematika peserta didik ditinjau dari self confidence. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 5(3), 2584–2593. <https://doi.org/10.31004/cendekia.v5i3.903>
- Nurhayati, Nurhasanah, & Dahliana. (2016). Dinamika motivasi belajar pada siswa mandiri di SMPN 10 Banda Aceh. *Jurnal Ilmiah Mahasiswa Bimbingan Dan Konseling*, 1(2), 73–79. <https://jim.usk.ac.id/pbk/article/view/1760>
- Nurul Ichsan, R., & Nasution, L. (2021). Sosialisasi pelatihan untuk meningkatkan prestasi kerja karyawan di PDAM Tirtanadi cabang Padang Bulan Medan. *Amaliah: Jurnal Pengabdian Kepada Masyarakat*, 5(1), 48–53. <https://doi.org/10.32696/ajpkm.v5i1.693>
- OECD. (2018). *Mathematics performance (PISA)*. <https://data.oecd.org/pisa/mathematics-performance-pisa.htm#indicator-chart>
- Purbiyanto, R., & Rustiana, A. (2018). Pengaruh disiplin belajar, lingkungan keluarga, dan motivasi belajar terhadap hasil belajar siswa. *Economic Education Analysis Journal*, 7(1), 341–361. <http://journal.unnes.ac.id/sju/index.php/eeaj>
- Puspitasari, H. M., & Sutriyono. (2018). Hubungan kemandirian belajar dan kedisiplinan belajar terhadap prestasi belajar matematika. *Jurnal Mitra Pendidikan*, 2(1), 1007–1020.
- Ramadona, P., & Yusri. (2019). Hubungan disiplin belajar dengan kemandirian belajar siswa. *Neo Konseling*, 1(2), 1–6. <https://doi.org/10.24036/00104kons2019>

- Sapardi, V. S. (2018). Hubungan penggunaan gadget dengan perkembangan anak usia prasekolah di PAUD/TK Islam Budi Mulia. *MENARA Ilmu*, 12(80), 137–145. <https://www.jurnal.umsb.ac.id/index.php/menarailmu/article/view/634>
- Sari, N. M. (2020). Analisis kesulitan siswa dalam mengerjakan soal matematika materi perbandingan kelas VII SMP Luhur Baladika. *Jurnal Equation: Teori Dan Penelitian Pendidikan Matematika*, 3(1), 22–33.
- Widayanti, E., & Kolbi, I. A. (2018). Analisis kesalahan siswa dalam mengerjakan soal TIMMS untuk kategori penalaran. *Jurnal Review Pembelajaran Matematika*, 3(1), 76–85. <https://doi.org/10.15642/jrpm.2018.3.1.76-85>
- Wulandari, A. (2022). *Analisis kemandirian belajar pada pembelajaran matematika siswa kelas VIII UPTD SMP Negeri 23 Barru* [Institut Agama Islam Negeri Parepare]. <http://repository.iainpare.ac.id/4150/>
- Yuliawan, H., & Nusantara, E. (2020). Hubungan antara keyakinan diri dan perilaku disiplin belajar dengan kemandirian belajar siswa kelas XI SMK se-Kabupaten Boja. *JURNAL EDUKASI: Jurnal Bimbingan Konseling*, 6(2), 124–138. <https://doi.org/10.22373/je.v6i2.6369>.