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# The Influence of Intrapersonal Intelligence on Mathematics Learning Achievement

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**Abstract**
Difficulty learning mathematics is a problem that often occurs, and this condition is considered to give a stigma that mathematics is a difficult subject. Various learning theories and approaches have been used, including recognizing, and exploring students' potential to find out whether there is other potential that can support their ability to understand mathematics, such as the ability to understand and evaluate oneself, also known as intrapersonal intelligence. This research aims to measure the influence of students' intrapersonal intelligence on their mathematics learning achievement by distributing questionnaires to measure their intrapersonal intelligence, as well as students' report cards as a representation of their mathematics learning achievement. In this study, the researcher used quantitative methods and found a positive and significant influence between intrapersonal intelligence on mathematics learning achievement on a strong scale.

**Keywords:** intrapersonal, intelligence, mathematics, achievements

## 1. Introduction

Education plays the ultimate role in the development of a nation. As a country with a large and diverse population, the challenges in Indonesia's education system are very complex. Efforts to overcome education problems in Indonesia are an urgent and strategic task to create an intelligent, skilled, and competitive society. Aspects that support the process of how to create an intelligent, skilled, and competitive society should be reviewed and improved from various points of view, including improving the quality of education, which can be achieved if at least the learning process; as a process of interaction between educators and students in an environment, can be carried out as ideally as possible (Agus Setiawan et al., 2023). This ideal process is expected can improve education's quality to create an intelligent, skilled, and competitive society. In general, the learning process usually occurs in classrooms in schools. Usually, various subjects are taught by teachers, and expect that students will have good abilities in each subject, with no exception also for mathematics.

Generally, mathematical abilities are usually learned at school when taking mathematics lessons. The teacher will evaluate the student's understanding through learning evaluations using exams, quizzes, or assignments, and the final calculation of all these evaluations using a certain formula will be written on students' report cards after following the learning process for a certain period. The researcher used the mathematics grade on the report card as the data of the mathematics learning achievement in this research (Dariyo, 2013).

High mathematics learning achievement is not an easy matter to achieve. Various factors must be considered to make the right approach, strategy, and method for each student to achieve good mathematics learning achievement. It is important to remember that everyone is unique, and the obstacles they experience may vary. Solutions to overcome these obstacles also need to be tailored to the needs and characteristics of everyone. Support from the environment, both at home and at school, can also play an important role in overcoming these obstacles.

These unique things then influence the results of student learning evaluation achievements. Mario stated that two factors that influence learning achievement are internal factors such as physical and psychological conditions, talents and interests, motivation, and others. Then, the external factors such as environmental conditions (Mario, 2023).

One example of internal factors within a person's personality is the ability to understand the self-condition and evaluate it, which will hereinafter be referred to as intrapersonal intelligence in this research. High intrapersonal intelligence in students also fosters a sense of responsibility in them (Zefanya, 2018). Thus, every student with high intrapersonal intelligence will represent efforts to understand learning material as an embodiment of their responsibility.

According to Yuliana and Rahmi, apart from knowing their desires, weaknesses, and strengths, someone with good intrapersonal intelligence can maintain positive influences and change behavior that has a negative impact on them (Yuliana & Hartini, 2021).

Meanwhile, Campbel (in Istianah, 2022) believes that a person with high intrapersonal intelligence can understand himself, both his strengths and weaknesses, and can express them well without imposing his will on others.

Furthermore, related to the ability to understand one's own condition, intrapersonal intelligence within a person also enables the owner to understand self-reflection, meta-cognitive thinking abilities, and awareness of the existence of spiritual reality (Paradita et al., 2019).

In line with this opinion, Yaumi and Ibrahim put forward several characteristics of someone with more comprehensive intrapersonal abilities, including; there is a good awareness of beliefs and morality, there is a good learning ability when learning is emotionally related, a love of justice, learning styles, and methods are influenced by attitudes and behavior, more effective when working alone than working in groups, there is a curiosity about the purpose of the work, high persistence in achieving goals, likes discussions related to one's urge to help others, likes to protect oneself and one's family and is willing to protest to correct mistakes (Yaumi & Ibrahim, 2013).

Another research found that intrapersonal intelligence impact students' achievements in mathematics learning, so it was recommended that mathematics learning be taught using methods that could also increase intrapersonal intelligence (Aswin et al., 2021).

A person's ability to evaluate his abilities will certainly have a massive impact if he can find the further steps to correct his shortcomings. Furthermore, students with good intrapersonal intelligence even have a good influence on students' motivation to learn mathematics (Arnidha & Maulani, 2022).

Based on the explanation above, the researcher conclude that the indicators of the intrapersonal intelligence are shown of these three dimensions such as (1) knowing their selves, (2) knowing what they want, (3) knowing their priorities. Indicators of dimension (1) include (a) recognizing their feelings, (b) being able to express thoughts, feelings, opinions, and beliefs, (c) having high self-evaluation ability, (d) having an attitude of independence, (e) able to maximize one's potential. Dimension indicator (2), namely, knowing personal goals and intentions. Dimension indicator (3), namely, knowing the prioritized things.

It is natural to assume that good intrapersonal intelligence, which has an impact on students' mathematics learning motivation, will have an impact on students' mathematics learning achievements. Thus, it is reasonable to assume that someone with high intrapersonal intelligence, who can evaluate his potential, will also be able to evaluate his mathematics learning abilities. So, students with good intrapersonal intelligence will improve themselves to get good grades in mathematics lessons.

However, in actual conditions, according to the mathematics teacher at the school where this research was conducted, it was found that there were students who had characteristics of high intrapersonal intelligence, but whose mathematics learning achievements tended to be low or poor.

Therefore, the researcher guesses that there is an influence between intrapersonal intelligence on mathematics learning achievement, and it is necessary to know the magnitude of the influence which has become the purpose of this research.

## 2. Methods

This research uses a survey method with a quantitative approach; namely, a method to find relationships between sociological or psychological variables (Sugiyono, 2018). Meanwhile, the quantitative approach refers to the data analyzed represented by numbers (Hermawan, 2019). The research used ex-post facto design which use the fact on samples that have occurred.
This research uses samples to obtain the data from the population; namely the entire research object (Fadilah Amin et al., 2023). The population of this study was all students in class VIII of Strada Mardi Utama I Jakarta Middle School in the even semester of the 2014/2015 academic year. The sample in this study was class VIII students at Strada Mardi Utama I Middle School, Jakarta in the even semester of the 2014/2015 academic year, obtained using a simple random sampling method,

where each member of the population had the same opportunity to become a research sample (Firmansyah & Dede, 2022). The determination of the sample size uses the Krejcie Morgan formula:

$$\sum n_i = \frac{\sum N_i}{\sum N} \sum n \qquad (1)$$

with total number of samples was 84 students out of 101 students in population of research.

Obtaining intrapersonal intelligence data collection was carried out by distributing questionnaires with a score range of 1 to 5 following the Likert scale, containing 25 statements prepared based on indicators of intrapersonal intelligence. Meanwhile, learning achievement data was carried out by using mathematics scores on student report cards. Collecting data research was conducted in April 2015 in two phases. The first phase was to obtain the data for the validity and reliability of the questionnaire testing, and the second phase for data research.

The researcher used the product moment formula

$$r_{xy} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{(N\sum X^2 - (\sum X)^2)(N\sum Y^2 - (\sum Y)^2)}} \qquad (2)$$

for the validity test which is the test to determine the suitability of the instrument to the variable measurement (Fadli et al., 2023), and then continued t-test using

$$t_{value} = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \qquad (3)$$

with decision rules:
if $t_{value} \geq t_{table}$ : the statement is valid,
if $t_{value} < t_{table}$ : the statement is not valid.
The test used the degree of freedom (df = n – 2).
Meanwhile, the reliability of questionnaire statement items was tested by calculating the correlation coefficient

$$r_b = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{(N\sum X^2 - (\sum X)^2)(N\sum Y^2 - (\sum Y)^2)}} \qquad (4)$$

and then continued to calculate $r_{value}$ using Spearman Brown

$$r_{value} = \frac{2r_b}{1+r_b} \qquad (5)$$

By using level of significance $\alpha = 0{,}05$ and degree of freedom (df = n – 2), the researcher set the decision rules as:
if $r_{value} \geq r_{table}$ : the statement is reliable,
if $r_{value} < r_{table}$ : the statement is not reliable.
Reliability testing is used to determine whether the instruments will produce a consistent result if the same instrument is used to test the same sample at different times (Fadli et al., 2023).

The researcher used Alpha Cronbach formula to test overall questionnaire reliability stated as:

$$r_{11} = \frac{k}{k-1}\left[1 - \left(\frac{\sum \sigma_t^2}{\sigma_t^2}\right)\right] \qquad (6)$$

where the variance $\sigma_t^2$ obtained from every statement on questionnaire using the formula

$$\sigma^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n} \text{ (Yusup, 2018).} \qquad (7)$$

The researcher also used the following guideline to interpret the level of the reliability.

**Table 1**

*Reliability interpretation guideline*

| No | scale | level |
|---|---|---|
| 1 | 0,00 - 0,199 | very weak |
| 2 | 0,20 - 0,399 | weak |
| 3 | 0,40 - 0,599 | medium |
| 4 | 0,60 - 0,799 | strong |
| 5 | 0,80 - 1,000 | very strong |

The researcher used the questionnaire with the valid and reliable statements to collect data. Based on the level of significance $\alpha = 0,05$ and degree of freedom $df = n - 2$, the intrapersonal intelligence questionnaire will be valid if $t_{value} \geq 1,73406$ and was obtained 25 statements are valid out of 35 statements. In the other side by using the same level of significance and degree of freedom, the reliability test requires $r_{value} \geq 0,3783$ and was obtained that 28 statements are reliable out of 35 statements. The researcher involved 20 students for both of this test.

The data analysis test was carried out by first testing whether the data distribution was normally distributed, and then a simple linear regression test was carried out to determine the direction of the relationship between the two research variables with the following regression equation

$$\hat{Y} = a + bX \qquad (8)$$

In this case, researchers use the notation Y to represent the mathematics learning achievement variable and $X_1$ to represent the intrapersonal intelligence variable.

In testing the hypothesis whether there is an influence of intrapersonal intelligence on mathematics learning achievement, the researcher used the following hypothesis:
$H_0$ :$\sigma_{yx_2} = 0$ There is no positive and significant influence of intrapersonal intelligence on mathematics learning achievement,
$H_1$ :$\sigma_{yx_2} > 0$ There is a positive and significant influence of intrapersonal intelligence on mathematics learning achievement.
The significant influence referred to in the hypothesis above is a linear and meaningful influence, which will be explained later in the results and discussion section of this paper.

## 3. Result and Discussion

The lowest score on the learning achievement variable using mathematics scores on participants' report cards was 66 and the largest score was 98 on a range of scores on a scale of 0 to 100. The researcher used the data to test the data normal distribution to determine whether the data comes from a population with normally distributed mathematics scores. The normally distributed data can be considered to represent the population (Sudiyanto, 2020). The researcher used the Liliefors formula with the criteria of test was the data will be normally distributed if $L_{value} < L_{table}$ with the test hypothesis:

$H_0$: the data normally distributed

$H_1$: the data is not normally distributed.

Based on Liliefors test with level of significance $\alpha = 0{,}05$, The researcher obtained $L_{value}$ of 0,0669 which is less than $L_{table}$ of 0,0966. Therefore, both of data intrapersonal intelligence and mathematics learning achievement obtained from the normally distributed population.

Then, based on the data obtained, a correlation analysis was carried out to find out how big the relationship is between intrapersonal intelligence and mathematics learning achievement. After that, the researcher continued data analysis to test the significance of the correlation using the t-test with the hypothesis:

$H_0$: Correlation has no significance

$H_1$: Correlation has significance

with the test criteria on level of significance $\alpha = 0{,}05$ stated as:

if $t_{value} \geq t_{table}$ then $H_0$ rejected, dan

if $t_{value} < t_{table}$ then $H_0$ accepted.

The result of the significance of the correlation represented in the following table:

**Table 2**

*Coefficient correlation significance test*

| Correlation coef. | Determination coef. | $t_{value}$ | $t_{table}$ |
|---|---|---|---|
| 0,7862 | 0,6181 | 11,521 | 1,664 |

The positive value of correlation coefficient of 0,7862 represented the existence of direct relation between students' intrapersonal intelligence and mathematics learning achievement. This shows that every increase that occurs in students' intrapersonal intelligence scores will be followed by an increase in scores in their mathematics learning achievement. Meanwhile, the value of $t_{value}$ = 11,521 > $t_{table}$ = 1,664 shows that we can decide to accept the hypothesis that the correlation that occurs is meaningful, or the significant correlation that occurs is not by chance. The coefficient of determination shows the magnitude of influence exerted by intrapersonal intelligence on achieving mathematics learning achievement scores (Hasanah et al., 2020). In this research, the researcher obtained the influence of intrapersonal intelligence on mathematics learning achievement was 61,81%.

The equation that represents how big intrapersonal intelligence influences mathematics learning achievement is represented by the following regression equation:

$$\hat{Y} = 24{,}769 + 0{,}547X. \quad (9)$$

The above regression equation shows us that there will be an increasing score of 0,547 of mathematics learning achievement for every increasing of one point of intrapersonal intelligence score (Putri et al., 2023). Meanwhile, the coefficient of 24.769 explains that other factors contribute to the influence on mathematics learning achievement of 24.769 points which are not discussed in this research.

The next statistical analysis was carried out to see whether the average of the data lay on a straight linear regression line using regression linearity test. Then, a regression significance test was carried out to ensure that the influence between intrapersonal intelligence and mathematics learning achievement did not occur by chance (Haslinda & M, 2016).
The researcher used the F-test to check the regression linearity test using the following test hypothesis:
$H_0$: regression is not linear
$H_1$: regression is linear.
By using the df or numerator degrees of freedom is k – 2 and the denumerator degrees of freedom is n – k on level of significance $\alpha = 0{,}05$, the researcher decided the test criteria as follows:
if $F_{value} < F_{table}$ then $H_0$ rejected, and
if $F_{value} > F_{table}$ then $H_0$ accepted.

Meanwhile, in testing the significance of regression using the F-test, the researcher used the following hypotheses:
$H_0$: the regression direction coefficient is not significant, and
$H_1$: the regression direction coefficient is significant.
By using the df or numerator degrees of freedom = 1 and the denumerator degrees of freedom = n – 2 on level of significance $\alpha = 0{,}05$, the researcher decided the test criteria as follows:
if $F_{value} > F_{table}$ then $H_0$ rejected, and
if $F_{value} < F_{table}$ then $H_0$ accepted.

The test hypothesis result represented in the following table:

**Table 3**

ANOVA *table for testing the linearity and significance of the regression equation of intrapersonal intelligence with mathematics learning achievement*

| Sources of Variance | df | Sum Square (SS) | Mean Square (MS) | F value | F table |
|---|---|---|---|---|---|
| | | | | | α = 0,05 |
| Regression (a) | 1 | 533129,333 | 533129,333 | | |
| Regression (b\|a) | 1 | 1949,974 | 1949,974 | 132,7292* | 3,96 |
| Residual | 82 | 1204,6927 | 14,69137 | | |

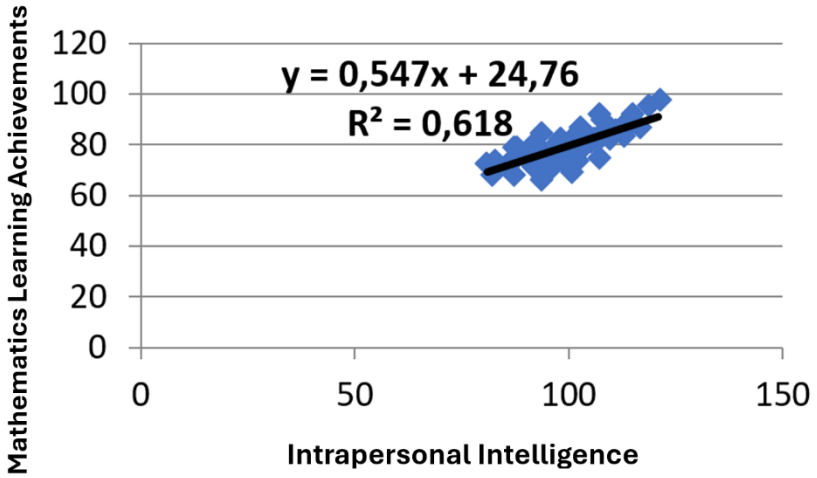
| | | | | | |
|---|---|---|---|---|---|
| Lack of fit | 31 | −1949,974 | −62,90239 | | |
| Error | 51 | 3154,6667 | 61,8562 | −1,01691[1] | 1,675 |
| Total | 84 | 536284 | 536284 | | |

*: significant
[1]: linear.

Based on analysis result in the table above, obtained that $F_{value}$ less than $F_{table}$ of $-1{,}01691$ less than 1,675 in the line of the lack of fit. This means that the influence that occurs between intrapersonal intelligence on mathematics learning achievement lies in a straight line generally. To illustrate this condition, researchers provide a data visualization in the graph below.

**Figure 1**

*Regression Graph of Intrapersonal Intelligence on Mathematics Learning Achievement*




In the residual line obtained that $F_{value}$ greater than $F_{table}$ of 132,7292 greater than 3,96 which decided that regression direction coefficient is significant, or in simply can be interpreted that intrapersonal intelligence does not coincidentally have an influence on mathematics learning achievement. From the regression equation $\hat{Y} = 24{,}769 + 0{,}547X$, we can conclude that, the intrapersonal intelligence influence mathematics learning achievement in a positive value of 0,547. Hence, the hypothesis regarding to the whether there is an influence between intrapersonal intelligence on mathematics learning achievement in this research, we can accept $H_1 : \sigma_{yx_2} > 0$ which state that there is a positive and significant influence between intrapersonal intelligence on mathematics learning achievement.

## 4. Conclusion

Based on the theory description and data analysis in the previous sections, obtained that there is a positive and significant influence between intrapersonal intelligence on mathematics learning

achievement. The correlation between intrapersonal intelligence and mathematics learning achievement is significant and linear. The regression equation $\hat{Y} = 24{,}769 + 0{,}547X$ shows that there would be score increasing in mathematics learning achievement of 0,547 for every one point increasing in intrapersonal intelligence score. This influence does not coincidentally, and it showed by $F_{table}$ of 132,7292 greater than 3,96 in the residual line. Therefore, the researcher suggests that every educational stakeholder who plays a role in teaching mathematics, including teachers, parents, and non-formal institution teachers, should pay attention to how important it is to emphasize self-evaluation to identify abilities and deficiencies or obstacles in learning mathematics, to achieve the better mathematics learning achievement.

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