The Influence of Students’ Self Confidence on Mathematics Learning Achievement

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Abstract. The math learning taught in schools has a lot of attention. Many factors also affect the achievement in learning mathematics. Self-confidence is one of the influential factors which is unrecognized regarding students’ mathematics achievement. Some studies have been done and showed that students’ self-confidence in learning mathematics influenced the mathematics learning achievement. Thus, self-confidence is essentially believed to improve students’ achievement in learning mathematics. This research discusses the influence of students’ self-confidence on mathematics learning achievement. Quantitative research method was employed as the research framework. The data were taken from 32 students in one class and they were analyzed through regression correlation technique. The results of hypothesis testing show that there is no significant relationship between students' self-confidence with students' achievement. However, the magnitude of the correlation shows 0.098956, meaning that students' self-confidence contributes 0.98\% to the mathematics learning achievement.

1. Introduction

Every subject taught in schools has their purpose. One of the subjects taught in the schools is mathematics' subject. According to Ruseffendi, [1] mathematics is the quintessence of science, meaning that mathematics does not depend on other fields and it can be understood precisely, and must use symbols and terms that have been agreed upon. In addition, mathematics has an important role in training students' logical thinking skills [2]. From that point, teachers in schools are required to pay attention on the factors that can influence students in learning mathematics. Concerning on the mathematics learning, some countries also have their own goals in a mathematical lesson, for example Singaporean Mathematics Framework (SMF), National Council of Teacher of Mathematics, and even the Regulation of the Minister of National Education (Permendiknas) in Indonesia. There are some concerned issues, for example problem solving, reasoning and proof, communication, connection, and representation [3],[4]. Those have intentions for students to understand mathematics well and gain learning achievement. The purpose of mathematics learning is also referred to the achievement of learning mathematics by various factors. One of them is students' self-confidence in learning mathematics. The purpose of mathematics learning in some countries, such as NCTM, SMF, Permendikbud proves that learning mathematics is one of the learning concerning both in developing and developed countries.

McElmeel [5] states that confidence is a faith or belief in one's self and one's own abilities to succeed. It is the belief that one will act in a right, proper, or effective manner. Furthermore, Willis (in Gufron and Risnawita, S.) states that self-confidence is the belief that a person is able to tackle a problem with
the best situation and can provide something pleasing to others [6]. Self-confidence is a positive mental attitude of an individual who positioned or conditioned himself can evaluate about themselves and their environment so that it feels comfortable to perform activities in an effort to achieve the planned goals [7]. Additionally, Reddy believes that self-confidence is an attitude which allows individuals to have positive yet realistic views of themselves and their situations. Self-confidence of people trust their own abilities, have a general sense of control in their lives, and believe that, within reason, they will be able to do what they wish, plan, and expect [8]. Self-confidence refering to Lie is convinced of her ability to complete a job and a problem [9]. Moreover, the confidence according to Salirawati is defined as a confidence in the ability of self against the fulfillment of every desire and expectations [10]. Self-confidence (usually termed confidence) refers to self-belief about abilities to do and learn mathematics in some context, not necessarily generally. Hence a learner may be confident within one area of mathematics, the other may not [11]. There are five aspects that build self-confidence, namely: self-awareness, intention, thinking, imagination, and acting as if [12]. However, according to Lauster (in MN Ghufron & Rini Risnawati S.) the aspects of self-confidence include: (a) belief in self-ability, (b) optimistic, (c) objective, (d) rational and reality [10].

Given attention on the experts’ viewpoints of self-confidence, the students’ success in learning mathematics is importantly influenced by the level of self-confidence [13]. Some previous research reveal that there is a positive association between self-confidence in learning mathematics with mathematics learning outcomes [7], [14], [15]. This means that the students’ self-confidence affects the achievement of learning mathematics. Learning achievement is the result of measurement and assessment of learning effort that can be expressed in the form of numbers, letters, and sentences that reflect the results achieved by each individual within a certain period of time [16]. Furthermore achievement is knowledge, skill and abilities that students have developed as a result of instruction [17]. Evans suggests that learning achievement is the ability of students in calculating and solving problems that can be measured through written tests [18]. Other opinions of student achievement is the status of subject-matter knowledge, understanding, and skills over time [19]. Academic achievement is designed with test scores assessed by the teacher. In addition, define achievement as the achievement of higher knowledge, competence, and level reflected in numbers, actions, and other forms of information or auburn acknowledgment.

Therefore, it can be assumed self-confidence influences mathematics learning achievement. This study aims to determine the influence of many students' self-confidence in mathematics learning achievement

2. Method
The method used in this research is simple quantitative regression linear method. The research design is presented as follows:

\[ X \rightarrow Y \]

\[ X = \text{Students’ self-confidence variables} \]
\[ Y = \text{Students’ mathematics learning achievement} \]

Based on the research design above, the researcher wanted to see the effect of students’ self-confidence on the mathematics learning achievement. The study was conducted in one of the first high school class VII (with age range 12-13 years) located in downtown Yogyakarta, Indonesia. The population of this research is all active students in grade VII in academic year 2017/2018 which consists of 7 classes. Sampling was done randomly, and the researcher gathered data in class VII B.

In this research, data analysis was done by describing the data and analyzing them using correlation analysis. Correlation analysis was employed in order to see the relationship between students' self-confidence and students' achievement. To know the existence of the correlation between students' self-confidence and student achievement, statistical calculation was done using normality test and correlation test. Normality test used is Kolmogorov-Smirnov normality and continued by using product moment.

Coefficient of the result as follows:

\[ r = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{(N \sum X^2 - (\sum X)^2)(N \sum Y^2 - (\sum Y)^2)}} \]
Then, the linear regression was done, to know students' self-confidence graph and learning achievement on positive vehicle. To draw, the following is the calculation.

\[
b = \frac{n(\sum_{i=1}^{32} XY) - (\sum_{i=1}^{32} X)(\sum_{i=1}^{32} Y)}{n(\sum_{i=1}^{32} X^2) - (\sum_{i=1}^{32} Y)^2}
\]

and
\[
a = \bar{y} - b(\bar{x})
\]

So get it, \( y = a + bx \)

Once obtained \( y = a + bx \) is then depicted in the \( x \)-axis and \( y \)-axis.

Data obtained from the results of mathematics achievement test and the questionnaires of students' self-confidence in learning mathematics were analyzed using MS-Excel.

Instruments used to measure the variables in this study was a test of mathematics learning achievement and student confidence questionnaire. This test was used to measure students' achievement in learning mathematics. This test was made in the form of multiple choice. The test of mathematics learning achievement had been validated by the expert that was the lecturer of education majoring in the graduate program of mathematics of Yogyakarta State University. This department had been discussed appropriately to measure student achievement. Another instrument in this study was a non-test instrument, which was a questionnaire about students' self-confidence. The questionnaire used consisted of 30 items of statement outline from five predetermined aspects and using Likert scale measurement. This instrument had been validated by an expert who was a post-graduate mathematics education lecturer at Yogyakarta State University, the institute had conducted research to measure students' self-confidence in math lessons.

3. Result and Discussion

The data obtained through questionnaire students' self-confidence and learning achievement of 32 students who used the sample research, were analyzed as follows:

3.1. Data Description

The data obtained are summarized as follows:

| Mode | Median | Mean  | Lowest Score | Highest Score | Range | Interquartile | Standard Deviation (SD) |
|------|--------|-------|--------------|---------------|-------|---------------|-------------------------|
| 106  | 107.5  | 109.3438 | 90           | 128           | 38    | 19            | 10.87646                |

The summary showed that the three data concentration values was almost the same, so it could be concluded that the average was meaningful. The raw data obtained were described as group data, with

\[
\text{length of class} = \frac{\text{highest score} - \text{lowest score}}{5} = \frac{128 - 90}{5} = 7.6 \approx 8.
\]

| Interval | Criteria       | Lower Limit | Upper Limit | Midpoint | Frequency | Cumulative Frequency |
|----------|----------------|-------------|-------------|----------|-----------|----------------------|
| 90 – 97  | Low Once       | 89.5        | 97.5        | 93.5     | 6         | 6                    |
| 98 – 105 | Low            | 97.5        | 105.5       | 101.5    | 6         | 12                   |
| 106 – 113| Medium         | 105.5       | 113.5       | 109.5    | 7         | 19                   |
| 114 – 121| High           | 113.5       | 121.5       | 117.5    | 8         | 27                   |
| 122 – 129| High Once      | 121.5       | 129.5       | 125.5    | 5         | 32                   |

The table 2 shows that the number of students with the highest frequencies is in the high criteria.
Table 3. Summary of Students' Achievement Data

| Mode | Median | Mean | Lowest Score | Highest Score | Range | Interquartile | Standard Deviation (SD) |
|------|--------|------|-------------|--------------|-------|---------------|-------------------------|
| 54   | 70     | 68.0625 | 34          | 86           | 52    | 17            | 12.20771               |

The data shows that the three data concentration value is almost the same so that it can be concluded that the mean is meaningful. The raw data obtained, described as group data, with \( \text{length of class} = \frac{\text{highest score} - \text{lowest score}}{5} = \frac{86 - 34}{5} = 10.4 \approx 11 \)

Table 4. Range of Data Criteria for Students' Achievement

| Interval | Criteria     | Lower Limit | Upper Limit | Midpoint | Frequency | Cumulative Frequency |
|----------|--------------|-------------|-------------|----------|-----------|---------------------|
| 34 – 44  | Low Once     | 33.5        | 44.5        | 39       | 1         | 1                   |
| 45 – 55  | Low          | 44.5        | 55.5        | 50       | 5         | 6                   |
| 56 – 66  | Medium       | 55.5        | 66.5        | 61       | 7         | 13                  |
| 67 – 77  | High         | 66.5        | 77.5        | 72       | 12        | 25                  |
| 78 – 88  | High Once    | 77.5        | 88.5        | 83       | 7         | 32                  |

The table 4 shows that the number of students highest frequencies is in the high criteria.

3.2. Normality Test Kolmogorov Smirnov
The normality test is performed to determine whether the sample data is from a normally distributed population. In addition, the normality test is a requirement to perform linear regression analysis.

a. Normality Test Students’ Self-Confidence
Hypothesis:
\( H_0 = \) Students' self-confidence questionnaire data is normally distributed
\( H_1 = \) The students' self-confidence questionnaires are not normally distributed
Level of significance (\( \alpha \)) = 0.05
\( D_{\text{index}} = 0.2578 \)
\( H_0 \) accepted if \( D_{\text{count}} \leq D_{\text{index}} \)
\( D_{\text{count}} = 0.09045 \)
\( H_0 \) accepted for \( 0.09045 \leq 0.2578 \) so that the self-confidential student questionnaire data is normally distributed.

b. Normality Test Students’ Achievement
Hypothesis:
\( H_0 = \) Students' achievement data is normally distributed
\( H_1 = \) Students' achievement data are not normally distributed
Level of significance (\( \alpha \)) = 0.05
\( D_{\text{index}} = 0.2578 \)
\( H_0 \) accepted if \( D_{\text{count}} \leq D_{\text{index}} \)
\( D_{\text{count}} = 0.0708 \)
\( H_0 \) accepted for \( 0.0708 \leq 0.2578 \) so that the self-confidential student questionnaire data is normally distributed.

3.3. Product Moment Correlation Test
To find out how much contribution students' self-confidence to students' achievement.
Hypothesis:
\( H_0 = \) There is no connection between students' self-confidence and students' achievement
\( H_1 = \) There is connection between students' self-confidence and students' achievement
Although it has no significant effect, there were positive associations between students’ self-confidence and students’ achievement at the level of significance 0.05. As disclosed by Bradley D. Piper that “It was not clear whether confidence promotes achievement or vice versa” [20]. In addition, it can be seen that students do not directly affect students’ achievement [21]. Basically, students’ self-confidence has a positive correlation to student achievement, as described in the previous explanation. But there are some other things that can affect the correlation between students’ self-confidence and students’ achievement. For example, age and grade level might also affect how a student attributed success and failure. Because of their more direct role in student learning, younger students might be more likely to attribute their success and failure to their teacher rather than their own efforts or abilities [21]. This study also reveals that there is no significant influence on students’ self-confidence and students’ achievement. Although it has no significant effect, this study helps to increase students’ confidence to study mathematics.

Thus, the improvement of students’ self-confidence in students’ achievement is 0.98%.

3.4. Linear Regression

From the raw data students’ self-confidence and students’ achievement is obtained:

\[
\begin{align*}
\sum_{n=1}^{32} x &= 3499 \\
\sum_{n=1}^{32} y &= 2178 \\
\sum_{n=1}^{32} xy &= 238558 \\
\sum_{n=1}^{32} x^2 &= 386261 \\
\bar{x} &= 109.3438 \\
\bar{y} &= 68.0625
\end{align*}
\]

So, \( b = \frac{(32 \times 238558) - (3499)(2178)}{(32 \times 386261) - (3499)^2} = 0.111 \), \( a = 68.0625 - (0.111)(109.3438) = 55.925 \), and \( y = 55.925 + 0.111x \)

That means, each unit of increase of \( x \) results in a \( y \) increment of 0.111. In accordance with previous research which revealed that there were positive associations between students’ self-confidence and mathematics learning achievement [7], [14], [15]. In this case, the positive associations between students’ self-confidence and mathematics learning achievement is only 0.111.

4. Conclusion

Based on the results of the data analysis, it could be concluded that students’ self-confidence has no significant effect on student achievement. Correlation of 0.098956 is significant, meaning that there is an increase of 0.111 units of students’ achievement for each unit of increase students’ self-confidence. The magnitude of correlation of 0.098956 indicates the students’ self-confidence influence 0.98% of students’ achievement. The results show that there is no significant effect. This can be happened due to small scope of sampling. In addition, there are several factors that can affect the positive correlation between students’ self-confidence and students’ achievement. One of these factors is student’s age level and student’s class level.

Highlighting some things that can affect the positive correlation, the next researchers should be those things. In addition. Taking a wider sample would results of a stronger study. Therefore, it is better for the next researchers to pay attention to the diversity of the subject to be examined.

5. References

[1] Russfendi E T 2010 Dasar-dasar Penelitian Pendidikan & Bidang Non-Ekstra Lainnya (Bandung: Tarsito)
[2] Sari N P, Juliana S, Rahmadi A Z, Rahman B 2015 PM-117 Pengaruh Permainan Harta Karun terhadap Peningkatan Kemampuan Berpikir Kreatif Siswa Sekolah Dasar Prosiding Seminar
Nasional Matematika dan Pendidikan Matematika UNY pp 821-826

[3] Depdiknas 2006 Permendiknas Nomor 22 Tahun 2006 Tentang Standar Isi Sekolah Menengah Pertama (Jakarta: Depdiknas)

[4] NCTM 2000 Principles and Standars for School Mathematics (Reston, VA: Author)

[5] McElmeel S L 2002 Character Education: A book guide for teachers, librarians, and parents (Greenwood Village: Greenwood Publishing Group)

[6] Gufron, M N, Risnawita S R 2012 Teori-teori psikologi (Yogyakarta: Ar-Ruzz Media)

[7] Suhendri H 2012 Pengaruh Kecerdasan Matematis-Logis, Rasa Percaya Diri, dan Kemandirian Belajar terhadap Hasil Belajar Matematika Prosiding Seminar Nasional Matematika dan Pendidikan Matematika

[8] Reddy M M 2014 A study of self-confidence in relation to achievement motivation of D.ed student J. Global Journal for Research Analysis 3 56

[9] Lie A 2003 101 Cara Menumbuhkan Percaya Diri Anak (Jakarta: PT Elex Media Komputindo)

[10] Salirawati D 2012 Percaya diri, keingintahuan, dan berjiwa wirausaha: Tiga karakter penting bagi peserta didik. J. Pendidikan Karakter tahun II no 2 pp 213-224

[11] Cretchley P D 2008 Advancing Research Into Affective in Mathematics Learning: Clarifying Key Factors, Terminology and Measurement Proceeding of the 31rd Annual Conference of the Mathematics Education Research Group of Australasia pp 147-153

[12] Preston D L 2007 365 Steps to self-confidence (Oxford: How To Content)

[13] Yates S M The Influence of Optimism and Pessimism on Student Achievement in Mathematics Personality and Individual Differences 14 1261

[14] Hannula M S, Majala H, and Pehkonen E 2004 Development Of Understanding and Self Confidence in Mathematics; Grade 5-8 Proceedings of the 28th Conference of the International Group for the Psychology of Mathematics Education vol 3 pp 17-24

[15] TIMMS 2012 TIMSS 2011 International Result in Mathematics (Chesnut Hill: TIMSS & PIRLS International Study Center)

[16] Tirtonegoro S 2001 Penelitian Hasil Belajar Mengajar (Surabaya: Usaha Nasional)

[17] Nitko A J and Brookhart S 2011 Educational Assessment of Students (Boston, MA: Person Education)

[18] Evans B 2007 Student Attitudes, Consetions and Achievement in Introductory Undergraduate College Statistic The Mathematics Educator http://files.eric.ed.gov/fulltext/EJ841563.pdf

[19] Linn R 2011 Student Learning, Student Achievement: How Do Teachers Measure Up?. http://www.npbts.org.pdf

[20] Piper B D 2008 Attitudes, Confidence, and Achievement of High-Ability Fifth Grade Math Students http://digitalcommons.unl.edu/mathmidsummative/29

[21] Lloyd J E V, Walsh J, and Yailagh M S 2005 Sex differences in performance attributions, self-efficacy, and achievement in mathematics: If I’m so smart, why don’t I know it? J. Canadian Journal of Education 28(3) pp 384-408