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RESEARCH ARTICLE

# Self-Concept and Learning Achievement of Mathematics Education College Student

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**Abstract**

Self-concept is one important factor in one's success, especially in education. This study aims to describe and analyze the relationship between students' self-concept in learning mathematics and mathematics learning achievement, and investigate the significance of differences in self-concept and learning achievement in mathematics education students seen from that semester. A total of 151 mathematics education students at the Teaching and Education Faculty of the University of Muhammadiyah Malang were used as participants in this study. Self-concept data and mathematics learning achievement were obtained through an online questionnaire using Google Forms. Descriptive statistics, correlation tests, and ANOVA tests were used in analyzing the data. Descriptions of self-concept and student achievement are presented per category and semester. Correlational analysis shows a very weak relationship between self-concept and student achievement. The results of the ANOVA test prove that there is no significant difference in self-concept in terms of student semesters. As for learning achievement there is a significant difference based on student semester.

Keywords: Self-concept, learning achievement, learning mathematics

**Abstrak**

Abstrak. Konsep diri merupakan salah satu faktor penting dalam keberhasilan seseorang, khususnya dalam bidang pendidikan. Penelitian ini bertujuan untuk mendeskripsikan dan menganalisis hubungan antara konsep diri siswa dalam belajar matematika dengan prestasi belajar matematika, serta untuk mengetahui signifikansi perbedaan konsep diri dan prestasi belajar pada siswa pendidikan matematika dilihat dari semester tersebut. Sebanyak 151 mahasiswa pendidikan matematika Fakultas Keguruan dan Ilmu Pendidikan Universitas Muhammadiyah Malang digunakan sebagai partisipan dalam penelitian ini. Data konsep diri dan prestasi belajar matematika diperoleh melalui angket online dengan menggunakan Google Forms. Statistik deskriptif, uji korelasi dan ANOVA digunakan dalam menganalisis data. Deskripsi konsep diri dan prestasi belajar siswa disajikan per kategori dan semester. Analisis korelasional menunjukkan bahwa terdapat hubungan yang sangat lemah antara konsep diri dengan prestasi belajar siswa. Hasil uji ANOVA membuktikan bahwa tidak terdapat perbedaan yang signifikan pada konsep diri ditinjau dari semester mahasiswa. Sedangkan untuk prestasi belajar terdapat perbedaan yang signifikan berdasarkan semester mahasiswa.

Kata-kata kunci: Konsep diri, prestasi belajar, pembelajaran matematika

## INTRODUCTION

Student's mathematical learning is interconnected to their attitudes and beliefs about mathematics as well as their academic abilities. Early mathematics and beliefs are highly predictive of future success and academic choices in mathematics, science, and technology (Cvencek et al., 2021). Academic achievement is one of the most positive consequences of formal education and a key factor in student academic success (Hyseni Duraku & Hoxha, 2018; Moore, 2019). Academic achievement has a significant impact on all aspects of life, beginning with social relationships, academic professions, and the capability to allocate resources, because all of the aforementioned aspects are dependent on a person's accomplishment (Hyseni Duraku & Hoxha, 2018). Academic achievement, or the ability of elementary school students to respond to academic setbacks, is not a predictor of academic achievement (Moore, 2019). Furthermore, several findings from existing studies indicate that academic success is related to student test anxiety, student study skills, and self-concept (Hyseni Duraku & Hoxha, 2018; Moore, 2019),

Different methods exist for defining and measuring math self-concepts. At a more basic level, self-perceptions

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and identities include student's assessments of their mathematical abilities or a connection of self with mathematics. Multidimensional integrative schemas made aware by experiences and advice through others, self-concepts in the perspective of becoming a math student, and expectations for one's mathematical skill are all at higher levels of complexity. (Cvencek et al., 2021). Self-concept is defined as "the totality of an individual's thoughts and feelings concerning himself as a specific object." The self-concept incorporates thinking and feeling because it is both a component of perception and reflection as well as an emotional experience to that interpretation and introspection (Onetti et al., 2019). The self-concept has traditionally been defined as the cognitive appraisal of one's expectations, descriptions, and prescriptions about oneself (Affum-osei et al., 2014).

Reflected appraisals, social comparisons, self-attributions, and psychological centrality are the four self-concept development principles. The basic concept of diffracted valuations is essential to the representational interactionist's contention that the self is a social product resulting from others' behaviors toward oneself, and that one actually comes for seeing himself or herself as other people do (Möller et al., 2020; Onetti et al., 2019). Social comparisons are used by individuals to compare and assess them self in relation to specific persons, communities, or social levels. Self-attribution states that people form opinions about themselves based on their actions and results. The final element, the psychological connectivity principle, states that the self is an interconnected system of hierarchically structured components, with some characteristics and identities being more absolutely essential to the self than others. Criteria become very crucial when people compare themselves to others in terms of superiority or inferiority, or better or worse (Onetti et al., 2019)

Self-concept is a key mediating construct that influences a wide range of psychological and behavioral outcomes (Möller et al., 2020) and it is a psychosocial variable that assesses an individual's perception of himself or himself (Onetti et al., 2019). Academic self-concepts of students, particularly in school, influence academic achievement, course selection, and subject interest (Möller et al., 2020). The two main motives for protecting and defending one's self-concept when one is observing, evaluating, and finally drawing conclusions about oneself that emerge from interactions with the environment (Onetti et al., 2019; Zalevskaya & Usatenko, 2020). As a result, the self-concept is understood to be a dynamic system of one's representation. Individuals' self-concept shapes them to be more confident in their abilities at work and to have a stable career identity (Tentama & Abdillah, 2019).

Several previous studies have shown that there is a productive correlation between academic achievement and self-concept (Afgani et al., 2019; Arens et al., 2020; Möller et al., 2020; Tentama & Abdillah, 2019). This means that if the self-concept is high, the learning outcomes will be high as well. Similarly, if the self-concept is low, the learning outcomes are low. However, several studies also explain that there is no strong correlation between academic achievement and self-concept (Awai & Ogori, 2016; Basith et al., 2021; Juliyanti & Pujiastuti, 2020; Yengimolki, et al, 2015). These results show that there is still a debate about the correlation between self-concept and learning achievement. In addition, the research that has been done is still dominant in elementary and middle school students. There is still very limited research that examines self-concept and learning achievement in higher education. Whereas self-concept influences identity and behavior, and it changes over time, evolving with age and experience (Cvencek et al., 2018; Onetti et al., 2019) and one part of self-representation, which is very important for success in learning. As a result, research on self-concept and learning achievement in college students is critical. The aims of this study were 1) to describe the self-concept and learning achievement of mathematics education students, 2) to analyze the relationship between learning achievement and self-concept of mathematics education students, 3) to analyze whether there were differences in self-concept and learning achievement of mathematics education students in terms of the semester.

## METHODS

### Types and Research Design

The purpose of the research is to describe the self-concept, and academic achievement, examine the significance of the relationship between self-concept and academic achievement of mathematics education students, as well as the significance of differences in self-concept and learning achievement based on semesters of mathematics education students, so the type of research used is descriptive inference with a quantitative approach (Creswell, 2017; Mustafa et al., 2020).

### Participant

The participants in this study were 151 students of the Mathematics Education Faculty and Teaching Sciences, University of Muhammadiyah Malang, with details of 20 semester II students, 39 semester IV students, 67 semester VI students, and 25 semester VIII students.

### Data and Data Collection

The data collected in this study were data on learning achievement and self-concept in learning mathematics as well as participant administrative data, in the form of gender and semester. Learning achievement data is in the form of an achievement index (IP) obtained in the even semester when the data is collected. Both of these data were collected through a questionnaire that was submitted to students in the form of Google Forms.

### Research Instruments

The research instrument used in this study consisted of a questionnaire. The questionnaire consists of two main parts. The first part is about student identity and achievement, while the second part is about self-concept in learning mathematics. Self-concept questionnaire in studying mathematics which consists of 10 statements, 7 positive statements, and 3 negative statements (items no 4, 8, and 10) with a choice of level of confidence/belief from 0 to 10 (Ahn & Bong, 2019). Mathematics is one of my best subjects which is an example of a positive statement and I hate/dislike mathematics is an example of a negative statement about self-concept.

### Data Analysis Technique

Data analysis was carried out in two stages. First done descriptively, descriptive statistics (mean and standard deviation) for all variables are calculated. Based on the mean value, self-concept was made into high and low

categories. Self-concept (KD) is categorized as high if the score is more than or equal to the mean and low if the score is less than the mean. The mean self-concept is 62.26. Categories for learning achievement (IP) are made into four categories, namely quite satisfying, satisfying, very satisfying, and praise (cum laude). The category is quite satisfactory (CM) if the GPA is 2.00-2.75, satisfactory (M) if the GPA is between 2.76-3.00, very satisfying (SM) if the GPA is 3.01-3.50, and with praise (cumlaude) if the GPA is 3.51-4.00. Both by inference, namely correlational analysis and ANOVA. After verifying that the data met the assumptions of parametric statistical analysis, a correlation analysis was performed which was used to test whether there was a significant relationship between self-concept and students' learning achievement in mathematics education. The ANOVA test is used to investigate whether there are significant differences in self-concept and learning achievement when viewed from student semesters. All analyzes used JASP software version 0.16.3.0 for Windows and the level of statistical significance at $p < 0.05$.

## RESULTS

The results of the research to be achieved focus on the research objectives, namely to describe, analyze relationships, and examine differences related to self-concept in learning mathematics and student achievement in mathematics education.

### Description of Self-Concept and Learning Achievement

The results of the descriptive analysis between self-concept and learning achievement are presented in general, based on categories and semesters which are presented in Tables 1, 2 and 3

**Table 1.**
**Descriptive Statistics GPA and Self-Concept (KD)**

| | IP | KD |
|---|---|---|
| Valid | 151 | 151 |
| Missing | 0 | 0 |
| Means | 3.44 | 62.26 |
| std. Deviation | 0.38 | 11.72 |
| Minimum | 1.44 | 36.00 |
| Maximum | 4.00 | 90.00 |

Based on the mean self-concept in Table 1, which is 62.26, high and low categories are formed. The score above is the same as the mean in the high category, while those that are less than the mean are in a low category. A description of IP and KD by category is presented in Table 2.

**Table 2.**
**Description of IP and KD by category**

| | Learning Achievement (IP) | | | | Self-Concept (KD) | |
|---|---|---|---|---|---|---|
| | CM | M | SM | Praise | Low | Tall |
| Valid | 1 | 10 | 37 | 103 | 79 | 72 |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 |
| Means | 2.73 | 2.89 | 3.26 | 3.56 | 53.19 | 72.22 |
| std. Deviation | NaN | 0.07 | 0.16 | 0.38 | 6.60 | 7.09 |
| Minimum | 2.73 | 2.76 | 3.00 | 1.44 | 36.00 | 63.00 |
| Maximum | 2.73 | 2.98 | 3.50 | 4.00 | 62.00 | 90.00 |

Based on Table 2 above, out of 151 students who have a low category self-concept, there are 79 students with an average of 53.19, the lowest score is 36, and the highest is 62. Students with a high category self-concept are 72 students with an average of 72.22, the lowest score is 63, and the highest is 90. While the grade point index (GPA) shows that in the quite satisfactory category there is 1 student with an average of 2.73, in the satisfying category there are 10 students with an average of 2.89, in the very satisfying category there are 37 students with an average of 3,264, and in the very satisfying category there are 37 students with an average of 3,264, and the category praise (cumlaude) there are 103 students with an average of 3.56. Furthermore, the description of IP and KD based on student semesters is presented in Table 3.

**Table 3.**
**Description of IP and KD by semester**

| | Learning Achievement (IP) | | | | Self-Concept (KD) | | | |
|---|---|---|---|---|---|---|---|---|
| | II | IV | VI | VIII | II | IV | VI | VIII |
| Valid | 20 | 39 | 67 | 25 | 20 | 39 | 67 | 25 |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Means | 2.96 | 3.39 | 3.50 | 3.75 | 63.60 | 61.97 | 62.63 | 60.68 |
| std. Deviation | 0.12 | 0.15 | 0.45 | 0.10 | 13.03 | 10.48 | 12.41 | 11.08 |
| Minimum | 2.73 | 3.14 | 1.44 | 3.54 | 47.00 | 36.00 | 38.00 | 41.00 |
| Maximum | 3.14 | 3.60 | 4.00 | 3.88 | 90.00 | 80.00 | 88.00 | 81.00 |

Based on Table 3, out of 151 students, in semester 2 there were 20 students with an average of 2.96 with the lowest GPA of 2.73 and the highest GPA of 3.14. In semester IV there were 39 students with an average of 3.39 with the lowest GPA of 3.14 and the highest GPA of 3.60. In semester VI there were 67 students with an average of 3.75 with the lowest GPA of 1.44 and the highest GPA of 4.00 and in semester VIII there were 25 students with an average of 3.75 with the lowest GPA of 3.54 and the highest GPA of 3.88. Furthermore, the self-concept of 2nd-semester students averaged 63.60, 4th- semester students average 61.97, in semester VI the average was 62.63, and in semester VIII with an average of 60.68. If you look at the average self-concept by semester, semester II and VI students are included in the high self-concept category, while semester 4 and 8 students are classified as having low self-concept. The results in Table 3 also show that the lowest mean learning achievement in semester II is 2.96 while the highest mean learning achievement is in semester VIII which is 3.75. Conversely, the lowest self-concept mean in semester VIII students is 60.68 and the highest mean is in semester II students, namely 83.60

## Correlation of Self-Concept and Student Learning Achievement

The results of the correlational analysis of self-concept and learning achievement of mathematics education students using the Person correlation are presented in Table 4.

**Table 4.**
**Pearson's Correlations**

| Variables | | KD | IP |
|---|---|---|---|
| 1. KD | Pearson's r | – | |
| | p-values | – | |
| 2.IP | Pearson's r | 0.12 | – |
| | p-values | 0.14 | – |

Based on the value of the Pearson correlation Table 4, there is a relationship between the variables of self-concept in learning mathematics and the grade point average (GPA) with a significance level of 0.12 and is included in the very weak correlation range because it is in the range between> 0 – 0.25. If seen from the value of p = 0.14 > 0.05, then there is no significant correlation between self-concept and student achievement in mathematics education.

## Self-Concept and Learning Achievement ANOVA Test Based on Semester

Before the ANOVA test was carried out, the test requirements were investigated, namely homogeneity and normality. The homogeneity test results are presented in Tables 5 and 6, while normality can be seen in the QQ Plot in Figure 1.

**Table 5.**
**Test for Equality of Variances (Levene's)- Self Concept**

| F | df1 | df2 | p.s |
|---|---|---|---|
| 0.85 | 3.00 | 147.00 | 0.47 |

**Table 6.**
**Test for Equality of Variances (Levene's) - Learning Achievement**

| F | df1 | df2 | p.s |
|---|---|---|---|
| 14.91 | 3.00 | 147.00 | 0.51 |

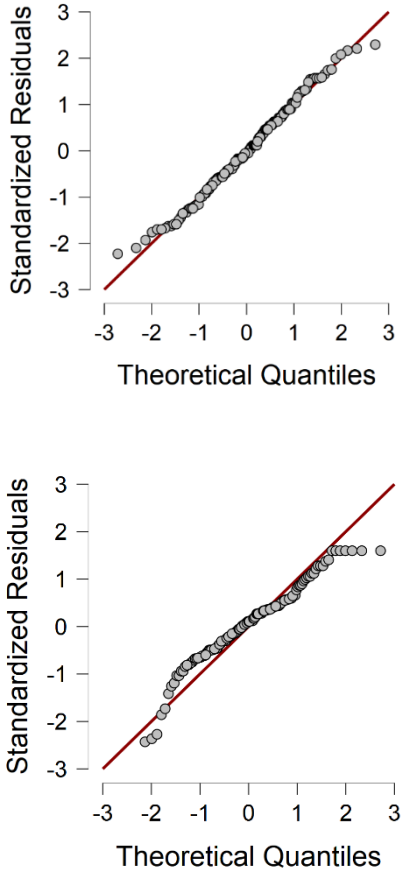


**Figure 1. QQ plots**

Based on the results in Tables 5 and 6 and Figure 1, the homogeneity and normality requirements are not violated for the ANOVA test. The results of the self-concept ANOVA test based on the semester are presented in Table 7. Meanwhile, the results for learning achievement are presented in Table 8.

**Table 7.**
**ANOVA – Self-concept by semester**

| Cases | Sum of Squares | df | Mean Square | F | p.s |
|---|---|---|---|---|---|
| Semester | 110.52 | 3 | 36.84 | 0.26 | 0.85 |
| Residuals | 20508.89 | 147 | 139.52 | | |

*Note.* Type III Sum of Squares

Based on Table 7, the value of F = 0.26 and p = 0.85 > 0.05 is obtained. This means that there is not enough reason to say that there are significant differences in self-concept when viewed from student semesters. As a result, there is no need to continue further tests, Post Hoc Comparisons test.

**Table 8.**
**ANOVA – Learning Achievement (IP) by semester**

| Cases | Sum of Squares | df | Mean Square | F | p.s |
|---|---|---|---|---|---|
| Semester | 7.21 | 3 | 2.40 | 23.79 | < 0.05 |
| Residuals | 14.84 | 147 | 0.10 | | |

*Note.* Type III Sum of Squares

Based on Table 8, the value of F = 23.79 and p < 0.05 is obtained. This means that there is sufficient reason to state that there is a significant difference in learning achievement in terms of student semesters. As a result, it is necessary to continue further tests, Post Hoc Comparisons test to see further what semesters there are significant differences and which are not significantly different. The test results are presented in Table 9.

**Table 9.**
**Post Hoc Comparisons – Semester**

| | | Mean Differences | SE | t | p Tukey |
|---|---|---|---|---|---|
| II | IV | -0.43 | 0.09 | -4.92 | < 0.05 |
| | VI | -0.53 | 0.08 | -6.59 | < 0.05 |
| | VIII | -0.78 | 0.10 | -8.22 | < 0.05 |
| IV | VI | -0.10 | 0.06 | -1.62 | 0.37 |
| | VIII | -0.35 | 0.08 | -4.35 | < 0.05 |
| VI | VIII | -0.25 | 0.07 | -3.36 | 5.42e -3 |

*Note.* P-value adjusted for comparing a family of 4

The results in Table 9 show that there is a significant difference in grade point averages (p <0.05) between students in semesters II and IV, semesters II and VI, semesters II and VIII, and semesters IV and VIII. Meanwhile, between students in semesters IV and VI and between semesters students VI and VIII there is no significant difference in terms of achievement index.

## DISCUSSION

Based on descriptive statistics, it was found that the learning achievement of mathematics education students was in the very satisfying and praised category of 92.71%. While self-concept with high category as much as 47.68%.Furthermore, if we look at the mean learning achievement, the lowest mean is in semester II and the highest mean learning achievement is in semester VIII. Meanwhile, the mean self-concept is lowest in semester VIII students and the highest mean is in semester II students. This means that there is no direct correlation between self-concept and learning achievement. This result is in line with the results of previous studies which stated that there was no positive relationship between learning achievement and self-concept (Awai & Ogori, 2016; Basith et al., 2021; Juliyanti & Pujiastuti, 2020; Yengimolki, et al, 2015). By inference, the results of the analysis stated that there was a very weak and insignificant positive relationship between self-concept and learning achievement. This result is under with several previous studies which stated that there was a positive correlation between learning achievement and self-concept (Afgani et al., 2019; Arens et al., 2020; Guo et al., 2022; Kulakow, 2020; Möller et al., 2020; Tentama & Abdillah, 2019)

The results of the ANOVA show that there is no significant difference in self-concept based on the semester. This is not in line with research which states that self-concept changes according to the times (Cvencek et al., 2018; Onetti et al., 2019). This research was conducted at one time with participants from various semesters, not several times/semesters with the same participant.

On the other hand, the results of the ANOVA analysis show that there is a significant difference in learning achievement if it is based on student semesters. This is in line the results of previous studies which stated that there were differences in students' mathematics achievement (Alamsyah, 2016; Annizar & Arifin, 2021; Muryaningsih & Mustadi, 2016).

## CONCLUSION

Based on the results and discussion that has been done, it is obtained that self-concept of mathematics education students is still dominant in the low category. When viewed from the student semester, the lowest self-concept mean occurred in semester VIII students and the highest mean was in semester II students. The learning achievement of mathematics education students was mostly with honors and very few with satisfactory predicates. When viewed based on the semester, the lowest mean learning achievement is in semester II and the highest is in semester VIII. This shows that there is an inverse between academic achievement and self-concept.

If you look at the correlation between academic achievement and self-concept, there is a positive correlation that is very weak and not significant. In addition, there is no difference in self-concept when viewed from the participant's semester. However, there is

a significant difference in the learning achievement of mathematics education students when viewed by semester. Differences in learning achievement occur between students in semesters II and IV, semesters II and VI, semesters II and VIII, and semesters IV and VIII. Meanwhile, between students in semesters IV and VI and between students in semesters VI and VIII there is no significant difference in terms of achievement indeks

*Suggestion*

This study examines learning achievement in terms of non-cognitive aspects, namely self-concept. Future research can examine learning achievement from the aspects of anxiety, motivation, and self-efficacy.

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## About the Author

**Baiduri** completed his Doctorate at Surabaya Public University on relational thinking in solving mathematical problems and published several studies on thinking processes in problem solving. Recently, he started researching non-cognitive factors that influence student learning success. Currently he is a lecturer in mathematics education department at the University of Muhammadiyah Malang.

## Competing Interest

They have no competing interests

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