LMS-Google Classroom Digital Platform: Impact on the Critical Thinking Ability, Self-Concept, and Mathematics Anxiety of Pre-Service Mathematics Teachers During the Covid-19 Pandemic in Indramayu, Indonesia

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Abstract. The purpose of this study was to determine the effect of self-concept and mathematics anxiety on the ability to think critically pre-service teachers of mathematics at the time of a pandemic Covid-19 in Indramayu, Indonesia with used digital platforms LMS-Google Classroom. This type of quantitative research uses one group pre-test post-test design. By using the purposive sampling technique, the research sample taken is the fourth-semester students who take the Abstract Algebra of Theory Ring course as many as 19 people. Research instrument in the form of critical thinking skills tests, self-concept questionnaires, and mathematics anxiety. Data analysis using ANOVA test. Based on the results, there is a direct influence self-concept and mathematics anxiety on the ability to think critically pre-service teachers of mathematics at the time of a pandemic Covid-19 in Indramayu, Indonesia by using a digital platform LMS-Google Classroom. There are other findings obtained, namely: the readiness of the lecturer in preparing the learning process must be very correct and can add applications that can face virtual eyes with students, such as the use of Zoom Meeting; the readiness of pre-service teacher in following the lecture process in the form of stable internet use because 90% of pre-service teacher come from the border area of Indramayu district and surrounding districts.

1. Introduction

Learning activities, both at the primary school, high school, and higher education levels have undergone very significant changes since the government imposed physical distancing and social distancing regulations as a measure to prevent the spread of Covid-19 which is getting higher. Based on this, the Indonesian government, in this case, especially the Ministry of Education and Culture, made the right decision, namely to close schools from elementary, middle school, to tertiary level from March 2020. The implementation of lectures that have been held several meetings and have been designed face-to-face, immediately must be transformed into an online learning process where technology becomes the main learning medium in the teaching and learning process. This is in line with the opinion [1] which states that technology makes transformed education more dynamic both in terms of learning and teaching. Online learning is a learning program that focuses on pedagogy or andragogy, technology, and integrated learning system design effectively in conveying learning material from teachers to students through asynchronous and synchronous communication [2]. According to research [3], technology development in education is divided into two things, the first is the development of
technology used to improve the skills of teachers and education personnel in using technology in the learning process. Research [4] also explains that online learning has become a growing and widespread phenomenon and provides tremendous support for the use of technology, information, and communication (ICT), especially in higher education.

Online learning benefits for students, the students can obtain information that is targeted at the time and tempo at desired by the very useful, easy and flexible and easier to understand and accessible to students [5] [6] [7]. The lecture system for students is also in line with developments in technology, information, and communication. One of the digital platforms that lecturers in higher education can develop is the Learning Management System (LMS). According to a study [8] [9], implementers' Learning Management System (LMS) in the learning process, is part of the learning media that is designed as an activity to learn that used to improve the results of student learning, providing a wide range of methods and motivation to learn, as well as offers easy modification and according to the learning needs to be needed.

Google Classroom is one type of Learning Management System (LMS) that is easy to use, both for educators and students. Google Classroom itself is a product from Google, which was developed specifically to help implement online learning or technology-based distance learning. According to research [10], Google classroom can also be referred to as a virtual classroom which can make it easier for students to learn lecture material independently, selectively, and increase student motivation and enthusiasm to better understand the material provided by the lecturer.

Mathematics with its many benefits in various fields makes it a very important science to learn at any time. One of the important benefits of mathematics is as a thinking tool that accompanies students in understanding mathematical concepts. Throughout the development of mathematics learning, the problems found in mathematics learning have become increasingly complex and complicated. To overcome this, it is necessary to improve continuously. Besides, students always think of mathematics as one of the most difficult and boring subjects. This assumption is a perception that harms many students who are not interested in mathematics. Moreover, the number of student learning outcomes of mathematics is low, both from the elementary, middle school, to college levels.

According to [11], mathematics is a discipline that is airbase to the thought process that is considered to be very good to be taught to students. In the process of learning mathematics, the load air game concept that is essentially encouraging students to be able to think logically and critically, following the pattern, the rules, and the rules that apply in a standard. Especially for the ability to think critically, it is very necessary for everyday life, so that they can filter and select information, question the truth and solve problems according to their needs. In the teacher's teaching is not just a transfer of information from the students, but involves the knowledge, create meaning, looking for clarity, is critical, and make a decision. With this, students will be able to have the ability to think which is better, easier to understand the problems, and menging at the concepts learned.

Johnson the [12] states that critical thinking is focused and clear processes used in mental activities such as solving problems, making decisions, persuade, analyze assumptions, and conduct scientific research. Students who can think critically will be able to process information, analyze, evaluate, and reason with their logic, then they will also be able to communicate their reasoning well. Students should be provided with the inability to think critically, it is indispensable to compete in a life that is growing every time. Because nowadays, people will very easily access information about various things via the internet. The capacity of critical thinking will be able to make sense person as the decision-maker either. Therefore, according to [13] the ability to think critically needed in solving problems or finding solutions to the problems that developed in the Era of Globalization.

In developing mathematical skills, especially critical thinking skills, one of the psychological aspects needed is self-concept and mathematics anxiety towards mathematics. According to McLeod in [14], affective do play in mathematics learning consists of self-concept, mathematics anxiety, self-efficacy, effort and ability attributes, causal attributions, learned helplessness, motivation, autonomy, aesthetics. Also, McLeod in [14] also mentions that the main concerns in the mathematics learning process are psychology, cognitive approaches, and conceptualization of the affective domain. Therefore, [15]
concluded that mathematics anxiety is one of the affective domains in mathematics which is very important.

According to the study [16], mathematical communication skill and self concept of students is still low, occurring in SMP 10 Cimahi and according to results of interviews and questionnaires by teachers and students of his, there was information that students often encounter difficulties when faced with the question contextual without illustrations. According to [17], the self concept of mathematics is a person's perception or view of his or her ability to learn mathematics. Mathematical self-concept is a person's beliefs, feelings, or attitudes regarding his ability to understand or do something in situations involving mathematics [18]. The purpose of writing this article is to determine the effect of self-concept and mathematics anxiety on the critical thinking skills of mathematics teacher candidates during the Covid-19 pandemic in Indramayu, Indonesia by using the digital platform LMS-Google Classroom.

Based on this, it is necessary to conduct research which becomes the urgency of the problem regarding how much mathematical critical thinking is influenced by students' self-concept and mathematics anxiety using the digital LMS-Google Classroom platform during the Covid-19 pandemic in Indramayu, Indonesia.

2. Methodology
This study is a quantitative study with a one-group pretest-posttest design [19]. The sampling technique in this study using purposive sampling. Samples were taken from the Mathematics Education Study Program at the FKIP Wiralodra University, Indramayu, Indonesia, which teaches the Abstract Algebra of Theory Ring course. One group consisted of 19 respondents. The data collection tools used are tests of critical thinking skills, self-concept questionnaires, and mathematics anxiety. Analysis Data Design analysis of the data is a one-group pretest-posttest. Because of the design as in Figure 1.

![Figure 1. One-group pretest-posttest design](image)

The design of one group pretest-posttest with details of $O_1$ and $O_2$ is the ability to think critically, self-efficacy, and mathematics anxiety. $X$ is the LMS-Google Classroom digital platform. The results of digital learning on the LMS-Google Classroom platform were carried out by testing the normality of data. Next, the ANOVA test is done using SPSS Window 20.

3. Result and Discussion

| Table 1. Descriptive Statistics |
|-------------------|-----------------|--------|
|                   | Mean            | Std.   |
| Critical Thinking Ability | 78.105          | 3      |
|                     |                 | 9.38021|
| Self Concept       | 114.68          | 42     |
|                     |                 | 5.29206|
| Mathematics Anxiety | 44.263          | 2      |
|                     |                 | 4.36962|

| Table 2. Coefficients |
|-----------------------|
| Model                 | Collinearity Statistics |
|                       | Tolerance | VIF  |
| 1                     | (Constant) | .204  | 4.908|
|                       | Self Concept | .204  | 4.908|
|                       | Mathematics Anxiety | .204  | 4.908|

a. Dependent Variable: Critical Thinking Ability

Based on the table above, a tolerance value = 0.204 and a VIF value = 4.908 are obtained. Tolerance value = 0.204 > 0.1 and VIF value = 4.908 < 10, it can be concluded that self concept and mathematics anxiety do not have multicollinearity.
Figure 2. Heteroscedasticity Test

The picture above shows that there is no heteroscedasticity pattern.

Data Normality Test

|               | Self Concept | Mathematics Anxiety | Critical Thinking Ability |
|---------------|--------------|---------------------|--------------------------|
| N             | 19           | 19                  | 19                       |
| Normal Parameters<sup>a,b</sup> |
| Mean          | 114.6842     | 44.2632             | 78.1053                  |
| Std. Deviation| 5.29206      | 4.36962             | 9.38021                  |
| Absolute      | .072         | .156                | .194                     |
| Most Extreme Differences |
| Positive      | .068         | .095                | .227                     |
| Negative      | -.072        | -.156               | -.194                    |
| Kolmogorov-Smirnov Z | .313     | .678                | .991                     |
| Asymp. Sig. (2-tailed) | 1.000  | .748                | .280                     |

<sup>a</sup> Test distribution is Normal.

<sup>b</sup> Calculated from data.

Based on the results of the above calculations, it can be concluded that:

1. Sig value. critical thinking skills = 0.280> 0.05 so that the data distribution of critical thinking skills is normally distributed.
2. Sig value. Self Concept = 1.000> 0.05 so that the distribution of Self Concept data is normally distributed.
3. Sig value. Mathematics Anxiety = 0.748> 0.05 so that the distribution of Mathematics Anxiety data is normally distributed.

Error Normality Test

Table 4. One-Sample Kolmogorov-Smirnov Test
Unstandardized Residual

| N          | 19 |
|------------|----|
| Mean       | 0E-7 |

Normal Parameters:

- Mean
- Std. Deviation
- Absolute
- Positive
- Negative
- Kolmogorov-Smirnov Z
- Asymp. Sig. (2-tailed)

a. Test distribution is Normal.
b. Calculated from data.

Based on the table above, the Sig. = 0.952 > 0.05, so that the data distribution is normally distributed.

**Linearity test**

| Table 5, ANOVA Table |
|----------------------|
| Sum of Squares | df | Mean Square | F | Sig. |
| (Combined)   | 1471.289 | 15 | 98.0 | 2 | .233 |
| Between Groups | 951.663 | 1 | 951.663 | 2 | .015 |
| Critical Thinking Ability * Self Concept | 519.626 | 14 | 37.1 | 16 | .583 |
| Within Groups | 112.500 | 3 | 37.5 | 00 |
| Total | 1583.789 | 18 |

Based on the table above, the value of $F_{hitung} = 0.990$ and Sig. = 0.583 > 0.05. So, it can be concluded that the regression model is linear.

| Table 6, ANOVA Table |
|----------------------|
| Sum of Squares | df | Mean Square | F | Sig. |
| (Combined)   | 1545.789 | 12 | 128.816 | 20.339 | .001 |
| Critical Thinking Ability * Mathematics Anxiety Between Groups | 1347.505 | 1 | 1347.505 | 212.764 | .000 |
| Linearity Deviation from Linearity | 198.285 | 11 | 18.026 | 2.846 | .105 |
| Within Groups | 38.000 | 6 | 6.333 |
| Total | 1583.789 | 18 |

Based on the table above, the value of $F_{hitung} = 2.846$ and Sig. = 0.105 > 0.05. So, it can be concluded that the regression model is linear.

**Hypothesis testing**

| Table 7, Model Summary | b |

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Table 8. ANOVA

| Model | Sum of Squares | Df | Mean Square | F    | Sig. |
|-------|----------------|----|-------------|------|------|
| Regression | 1365.353 | 2 | 682.677 | 50.005 | .000 |
| 1 Residual | 218.436 | 16 | 13.652 | |
| Total | 1583.789 | 18 | |

a. Dependent Variable: Critical Thinking Ability
b. Predictors: (Constant), Mathematics Anxiety, Self Concept

Based on the table above, the F_count = 50.005 and Sig. = 0.000 <0.05. So, it can be concluded that there is a direct influence on self-concept and Mathematics Anxiety together on critical thinking skills.

Table 9. Coefficients

| Model | Unstandardized Coefficients | Standardized Coefficients | t    | Sig. |
|-------|-----------------------------|---------------------------|------|------|
|       | B   | Std. Error | Beta |      |      |
| (Constant) | 233.500 | 59.911 | | 3.897 | .001 |
| 1 Self Concept | -.417 | .365 | -.235 | -1.143 | .270 |
| Mathematics Anxiety | -.243 | .442 | -1.132 | -5.505 | .000 |

a. Dependent Variable: Critical Thinking Ability
b. Predictors: (Constant), Mathematics Anxiety, Self Concept

1. Self Concept: t_hitung = -1.143 and Sig. = 0.270 > 0.05. So, it can be concluded that there is no direct effect of self-concept on critical thinking skills.

2. Mathematics Anxiety: t_hitung = -5.505 and Sig. = 0.000 <0.05. So, it can be concluded that there is a direct effect of Mathematics Anxiety on critical thinking skills.

The results of this study are in line with research [20] which states that this digital platform provides a central site for communicating with students, sending feedback, and providing homework. Google classroom implications of the implementation of learning in Indonesia, particularly in higher education is to improve the quality of lecturers and prospective teachers of mathematics to improve critical thinking skills, self-concept, and anxiety in mathematics resolve using the technology implemented should be wise and maximum. Along with the times, the use of communication technology is applied to facilitate prospective mathematics teachers in Indonesia who are constrained by access to the learning process held by related educational institutions. Implementation Education in blended learning is very helpful in addressing the problems of education in Indonesia since Indonesia is a country composed of the cluster of islands as well as providing education blended learning already has legislation in force. Blanded learning education must also be supported by facilities and infrastructure that guarantee the quality of its users. For planning the implementation of learning using the LMS-Google Classroom digital platform in the future, it is hoped that distance management will be further developed by all educational institutions in Indonesia under the National Education Standards.

4. Conclusion

Google Classroom is part of the digital platform of productivity applications for lecturers, students, teachers, and students in carrying out online learning and collaboration activities. This application is
easy to download and available free of charge, but must be placed at the level of an educational institution.

The benefits of using digital platforms google classroom in the process of organizing learning in Indonesia, particularly in the study at the level of higher education is to improve the quality of prospective mathematics teachers in using technology to see that there are a direct influence self-concept and mathematics anxiety on the ability of critical thinking in the use digital platform LMS-Google Classroom during the Covid-19 pandemic in Indramayu. Also, the use of the digital platform LMS-Google Classroom can be implemented as a good and wise, especially for activities lectures, can saving time, environmentally friendly, able to overcome the distance of residence to the campus, increasing cooperation among prospective teachers of mathematics as well as with faculty, communication yes ng is not limited by time and space, as well as safe and inexpensive document storage.

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