Exploring Math Anxiety Towards the Students' Computer Self-Efficacy in Learning Mathematics

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Abstrak

Di tengah pandemi Covid-19, siswa dituntut menguasai penggunaan komputer dalam pembelajaran matematika daring. Tingkat efikasi diri yang tinggi dapat secara signifikan mengurangi kecemasan matematika siswa dan sebaliknya. Tujuan penelitian ini adalah untuk mengetahui tingkat kecemasan matematis terhadap efikasi diri komputer dalam pembelajaran matematika, dan mengetahui hubungan antara kecemasan matematis terhadap efikasi diri komputer. Penelitian kuantitatif ini menggunakan survei untuk mengumpulkan data. Partisipan dipilih dengan menggunakan probability sampling. Angket berisi 25 soal juga diberikan kepada 200 siswa kelas 8 MTSN 7 Model Ciracas. Hasil penelitian menunjukkan bahwa seluruh indikator pada variabel kecemasan matematika menunjukkan skor rata-rata sedang dengan skor rata-rata tertinggi (3,14). Rata-rata efikasi diri komputer masih tergolong sedang dengan indikator tingkat besaran ($\bar{x}$= 2,97) sebagai nilai rata-rata tertinggi. Nilai koefisien korelasi sebesar -0,193 menunjukkan adanya hubungan negatif yang signifikan dengan derajat korelasi yang dapat diabaikan.
Kata kunci: Efikasi Diri Komputer; Pembelajaran Matematika; Kecemasan Matematika.

Abstract

Amidst Covid-19 pandemic, students were required to master the use of computers in online mathematics learning. High level of self-efficacy could significantly reduce students' math anxiety and vice versa. The purpose of this study was to determine the level of mathematical anxiety towards computer self-efficacy in learning mathematics, and investigate the relationship between mathematical anxiety towards computer self-efficacy. This quantitative study used survey to collect the data. The participants were selected by using a probability sampling. A questionnaire containing 25 questions were also given to 200 students in 8th grades at MTSN 7 Model Ciracas. The results revealed that all indicators in the mathematics anxiety variable showed a moderate average score with the highest average score (3.14). The average of computer self-efficacy was still moderate with a magnitude level indicator ($\bar{x}$= 2,97) as the highest average value. The correlation coefficient value was -0.193 implying that there was a significantly negative relationship with a negligible degree of correlation.
Keywords: Computer Self-Efficacy; Learning Mathematics; Mathematical Anxiety.

I. INTRODUCTION

The development of Science and Technology has emerged globalisation. Each country is striving to maintain its existence among the others. One of the strategies is encouraging the improvement of the human resources quality to be savvy and competitive through a good education process (Anti & Susanto, 2017; Rozi & Afriansyah, 2022). This could be achieved by improving the education system according to the technology development with the intention that accelerate the science development beyond the boundaries of space, bureaucracy, ability, and time (Syofyan, Susanto, & Ulum, 2022).

Information and communication technology (IT) is a general term covering any technical devices to process and deliver information. IT is divided into two aspects, namely information technology and communication technology. Information technology includes anything that deals with the processing, using, manipulating, and controlling the information. Meanwhile, communication technology is dealing with the use of the devices to control and transfer the data from one device to another (Rahma et al., 2021).

Currently, Indonesia is facing the coronavirus disease 2019 (Covid-19) outbreak. This provides its own challenges for educational institutions as on 24 March 2020 the Minister of Education and Culture of the Republic of Indonesia issued Circular Letter Number 4 of 2020 concerning the Implementation of Education Policy amidst Emergency Period of the Spread of Covid-19

instructing the learning process was to be carried out at home through online/ distance learning to provide meaningful learning experiences for students. Online learning is the process of learning through the use of the internet.

To support the online learning, each individual is supposed to be digitally literate. Digital literacy is defined as an ability to understand and use the information in various types of resources and present it on the computer (Yasin, 2021).

Online learning has several advantages in terms of time and place as it can be conducted anywhere and anytime (Shukla *et al.*, 2020; Permatasari & Afriansyah, 2022). The use of online resources allows students to be exposed to numerous resources in the internet (Hastini, Fahmi and Lukito, 2020). The use of the technology is considered to be helpful to conduct the learning process during social distancing of COVID-19 pandemic (Pakpahan and Fitriani, 2020).

Nevertheless, the online learning also has caused a great number of issues mainly dealing with the internet connection (Hastini et al., 2020). Besides, the internet connection is considered too costly for some student's families who are struggling with financial problems (Morgan, 2020 in Oktawirawan, 2020). The accomplishment of the online learning relies on schools to provide the facilities, and teachers to utilize the computer and the application needed in the online learning (Rusdiana and Arinto, 2017; Toheri, Kismeina, & Persada, 2022).

Besides, the challenges come from students, concerning anxiety and distress

due to the extensive assignments while they are encouraged to search for the answers to the problems independently with a very little assistance from the teacher due to inadequate time to interact on the online platform. The students are encouraged to gather the data solution on the internet that promotes their IT mastery and efficacy. According to (Bunyamin and Sauda, 2019); (Rahmadhani and Mariani, 2021), computer self-efficacy deals with the ability to organise the assignments or do the tasks that require the use of computers. Computer skills demonstrate to what extent an individual's computer mastery is able to solve tasks requiring a certain program to analyse data (Ramadhani & Mariani, 2021).

According to (Compeau & Higgins, 1995 in (Adi & Yanti, 2018), there are three dimensions of computer self-efficacy, namely 1) magnitude, 2) strength, and 3) generability. Magnitude dimension refers to the expected capacity level of the computer use. The second dimension, strength, deals with the belief of the individual to successfully complete the computing tasks. The last dimension, generability, refers to the judgement level of the user limited to special activity domains.

Students' confidence in answering and solving problems is shattered by fear or anxiety when they answer incorrectly. The students' computer self-efficacy during online learning psychologically supports students' confidence in learning mathematics. Higher-achiever students without psychological support aspects, such as confidence in solving mathematics through online systems, usually do not develop significantly and the results of

learning mathematics in the classroom will not be ideal. This happens due to the lack of confidence in solving mathematics problems online using computer devices (Maesya Firdaus, Purwanto and Nuriadin, 2021).

Online learning systems have been implemented on all subjects, including mathematics. Mathematics has a vital role in various fields of life, for example, various information and ideas are communicated or conveyed with mathematical languages, and many problems are presented in mathematical models (Kurniati and Murniati, 2016). In addition, by studying mathematics, an individual will be familiar with thinking systematically, scientifically, logically, critically, and creatively.

Dealing with the development of information technology, an individual may respond to the existence of computers for learning mathematics differently from others. It is affected by the differences in skill and knowledge that cause anxiety. Math Anxiety is a feeling of anxiety and fear to do mathematical problems. These feelings arise because of students' difficulties in understanding mathematical operations.

Online learning of mathematics during COVID - 19 pandemic has negatively affected the students, caused anxiety among the students because the content of the learning process is predominated by theoretical explanations. The learning process does not provide opportunities for students to practice and learn effectively. On the other hand, maths is a subject that requires a lot of practice on problem solving to improve students' understanding and

habituation. mathematics is a subject that requires a lot of practice problems in order to improve students' understanding and conditioning.

Mathematics anxiety is often encountered at the junior high school level. The teachers are not only focused on delivering material but they are obliged to provide guidance related to the emotional condition of students who tend to be unstable. Junior High School students tend to think that mathematics is a frightening and stressful subject restraining them to answer the problem given. Furthermore, students hesitate to ask. It is possible to recognize when the students show the signs of trembling, looking down, and often going to the restroom just before the teacher is going to ask a question (Katarina Novita Sari, 2018).

This maths anxiety should be understood by teachers as it will affect students' learning achievement. It will continue if students unable to overcome the feeling by themselves. Teachers might also find it difficult to do assessment because there are some barriers in understanding the students.

Some studies on math anxiety and computer self-efficacy has been conducted by (Khoirunnisa and Ulfah, 2021) which stated that the score of math anxiety in online learning was at a moderate level, while the results of another study (Febryliani et al., 2021) showed that math anxiety in online learning tended to be higher.

Based on this background, the researcher chose to conduct a study to explore the mathematical anxiety towards students' computer self-efficacy in learning mathematics at Madrasah Tsanawiyah (MTS) as other studies related to computer self-efficacy were mostly carried out at higher education levels and related to the use of computer software, while this study related to mathematical anxiety. In addition, computer self-efficacy in learning mathematics is the latest topic according to the world issues hit by the Covid 19 pandemic, requiring students to learn with the help of the internet through the use of computers. Thus, this study aimed to determine the level of mathematical anxiety towards computer self-efficacy in learning mathematics, then investigate the relationship between mathematical anxiety and computer self-efficacy.

II. METHOD

This study was conducted at MTSN 7 Model Ciracas, East Jakarta on 12th of November 2021 to 15th of November 2021. The quantitative study used a survey conducted on the students of class VIII-1 to VIII-6. The data were analysed by using descriptive statistical methods. The sample selection was carried out using a sampling technique, namely probability sampling and it was decided that a sample of 200 students was obtained from a population of 250 students. The survey was carried out by giving questions or statements in the form of a questionnaire to the respondents regarding the opinions, beliefs, and attitudes of each respondent regarding mathematical anxiety to computer self-

efficacy in learning mathematics (Sugiyono, 2018).

The instrument used in this study was a questionnaire divided into two parts, namely mathematical anxiety towards computer self-efficacy with a 5-point Linkert scale. The questionnaire contained 25 statement items that measured the level of mathematical anxiety towards computer self-efficacy of students based on the aspects of emotion, judgement and environment that had been adjusted to the needs of the study.

The Indonesian version of the instrument was validated by expert validator and, then, revised under the validator's supervising. It was arranged and transformed into google form documents to be distributed to the participants.

This study had received the participants' consent and they voluntarily responded to the questionnaire. Their responses were achieved and confidential. The score of "completely disagree" was 5, "disagree" was 4, "neutral" was 3, "agree" was 2, and "completely agree" was 1. The score was processed by SPSS.

Table 1 presents the average interval of the questionnaire regarding anxiety and computer self-efficacy in learning mathematics, using Likert Scale (Khoerunnisa & Ulfahm, 2021).

Table 1.
Questionnaire Interpretation

Mean (Rata-rata)	Intepretasi
1,00-1,79	Very low
1,80-2,59	Low
2,60-3,39	Moderate
3,40-4,19	High
4,20-5,00	Very high

After descriptive analysis, correlation analysis among variables was conducted. The correlation coefficient value was between 1<0<1, namely if r = -1 perfect negative correlation, meaning that the significance level of the influence of variable X on variable Y is very weak and if r=1 perfect positive correlation, meaning the significance level of the influence of variable X on variable Y is strong, whereas r=0 means there is no correlation among the variables. The correlational level was measured based on the indicators presented in table 2 (Sudjana, 2005).

Table 2.
Questionnaire Interpretation

Nilai r	Intepretasi
0,00-1,199	Very weak
0,20-0,399	Weak
0,40-0,599	Moderate
0,60-0,799	Strong
0,80-1,000	Very strong

III. RESULTS AND DISCUSSION

The data obtained from the participants' responses were analysed by using descriptive statistics to identify the level of mathematical anxiety towards the students' computer self-efficacy in learning mathematics. The results descriptive statistics obtained from the questionnaire scores are presented in Table 3.

Table 3.
The Number of Students by Gender

Gender	Number	Percentage %
Male	83	41,50
Female	117	58,50
Total	200	100,00

According to Table 3, the majority of the participants, which was 58,5% of the samples, were female students, and 45,5% of them were male students.

Before conducting further investigation,

the researcher conducted the validity test to determine the validity value of an instrument in measuring the variables. In this study, there were 25 items to be tested. The results of the validity test were presented in Table 4.

Table 4
The Results of Validity Test of The Mathematical Anxiety Items

Indicators	r count	r table	Conclusion
X1	0,693	0,138	Valid
X2	0,682	0,138	Valid
X3	0,737	0,138	Valid
X4	0,707	0,138	Valid

Based on Table 4, the value of r count>r table of the product moment was obtained, so all items on the maths anxiety variable were considered valid (Sujarweni, 2014).

Table 5
The Results of The Validity Test of The Mathematical Anxiety Items

Indicator	r count	r table	Conclusion
Y1	0,718	0,138	Valid
Y2	0,754	0,138	Valid
Y3	0,463	0,138	Valid
Y4	0,611	0,138	Valid
Y5	0,681	0,138	Valid
Y6	0,684	0,138	Valid
Y7	0,674	0,138	Valid
Y8	0,659	0,138	Valid
Y9	0,604	0,138	Valid
Y10	0,754	0,138	Valid
Y11	0,687	0,138	Valid
Y12	0,723	0,138	Valid
Y13	0,737	0,138	Valid
Y14	0,768	0,138	Valid
Y15	0,676	0,138	Valid
Y16	0,598	0,138	Valid
Y17	0,411	0,138	Valid
Y18	0,642	0,138	Valid
Y19	0,710	0,138	Valid
Y20	0,727	0,138	Valid
Y21	0,584	0,138	Valid

Based on Table 5, the value of r_{count} > r_{table}, meaning that all the questionnaire items of computer self-efficacy variables were valid (Sujarweni, 2014).

Tabel 6.
The results of reliability test

Indicator	Guttman Split-Half Coefficient	Conclusion
Computer Self Efficacy	0,91	Reliabel
Kecemasan Matematis	0,877	Reliabel

After conducting the validity test, then the reliability test was carried out. Reliability is an index that shows the extent to which a measuring instrument (list of statements) can be trusted or reliable. In accordance with (Riduwan, 2014), based on Table 6, the test revealed that Guttman Split-Half Coefficient correlation value for mathematical anxiety was 0.877>0.80, thus the study concluded that the items for the mathematical anxiety variable are reliable. Furthermore, the Guttman Split-Half Coefficient correlation value for the computer self-efficacy variable was 0.910>0.80, and thus, the study concluded that the questionnaire items of computer self-efficacy was reliable.

Table 7.
Descriptive analysis of mathematical anxiety

Indicator	Mean	Std. Deviation	Interpretation
Test	3,14	1,16	Moderate
Confidence	3,11	1,09	Moderate
Knowledge Mathematics	2,94	1,12	Moderate

Learning Activities	2,95	1,12	Moderate

Based on Table 7, the test indicator (x3,14) resulted the highest score. This finding implied that the mathematical anxiety on the test indicator was categorized into moderate. In general, the average score of the mathematical anxiety in online learning was moderate.

Tabel 8.
Analisis Deskriptif *Computer Self Efficacy*

No	Indicators	Mean	Std. Deviation	Interpretation
1	Magnitude	2.97	1.15	Moderate
2	Strenght	2.92	1.14	Moderate
3	Generablity	2.90	1.08	Moderate

Based on Table 8, the average score of computer self-efficacy was categorized into moderate. It meant that the students were not confident in their computer ability in online mathematics learning. The level of magnitude ($x =$ 2,97) was the indicator with the highest score.

Table 9
Correlational test results

		YT	xtt
YT	Pearson Correlation	1	-0,193**
	Sig. (2-tailed)		0,006
	N	200	200
XT	Pearson Correlation	-0,193**	1
	Sig. (2-tailed)	0,006	
	N	200	200

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

The correlational test was conducted to determine the relationship between the variables. Based on the data presented in table 9, correlational value was 0.193; p=0.006 (p<0,05), meaning there was a negative relationship between computer self-efficacy and mathematical anxiety in learning mathematics, and vice versa. It implied that the higher the computer self-efficacy, the lower the students' anxiety. Pearson correlational value was 0.193, meaning the Pearson correlational value was between $0 - 0.25$ categorised as very weak (Sarwono, 2006).

According to (Wulandari and Agustika, 2020), mathematics anxiety is a condition when students were feeling scared and anxious during mathematics lessons due to lack of ability in mathematics, confidence, the teachers' characters, the teaching strategy (Datta, 2018; Mammarella & et al, 2019). Based on the results of this study at MTSN 7 Model Ciracas, the study revealed that all indicators in the mathematics anxiety variable appeared to be a medium or average and the exam indicator showed the highest average score. It meant that the students' mathematics anxiety in online learning was at a moderate level. The students did not demonstrate much confidence in learning mathematics. The statement contained in the indicator regarding students' feelings when facing exams was that students were unable to think well. This result was in line with the observation result pointing out the students' anxiety during exams. Other signs were sweaty and trembling when encountering complex problems to solve.

The results of this study were supported by (Khoirunnisa & Ulfah, 2021) stated that that the mathematics anxiety of junior high school students in online learning was generally in the moderate category. The study concluded that MTSN 7 Model Ciracas

students demonstrated insufficient level of abilities in learning mathematics, especially when the mathematics test took place.

Online mathematics learning was considered monotonous and lack of problem-solving materials. It might distress the students with problem solving problems and trigger anxiety. Mathematics anxiety may affect students' achievement and ability in learning mathematics, so the role of teachers was expected to be able to understand and develop strategies, and monitor the students' mathematics anxiety.

Furthermore, the overall average score of computer self-efficacy of the students was in the medium category. On the other hand, the magnitude level indicator scored the highest average. It implied that students' ability to complete computer-related tasks was still at a moderate level, meaning that students were not fully confident and satisfied in their ability to use computer devices in online mathematics learning.

According to (Rustiana, 2004), a low level of Computer Self Efficacy magnitude was caused by lack of support or assistance. The students with high level of Computer Self Efficacy magnitude were able to complete their tasks with low support and assistance from others, compared to low levels of Computer Self Efficacy magnitude. Based on the finding, the study concluded that the ability of the students to understand tasks was still in the medium category, meaning that students were able to do their tasks with assistance.

In line with this study, (Wicaksono and Saufi, 2013) found that high school students were unsure about their ability for mathematics exams due to lack of practise, so students were not certain of getting the desired score in mathematics (Wicaksono and Saufi, 2013).

Furthermore, based on the analysis of the relationship or correlation between computer self-efficacy and anxiety, the finding implied that there was a high degree of negative relationship between the variables. The results of this study were in accordance with other studies conducted by (Permana, Harahap and Astuti, 2016); (Fatmawati and Laksmiwati, 2022) stating that anxiety was negatively correlated with self-efficacy. The students who were unable to cope with challenging tasks showed higher anxiety level than those who werel capable. In this case, this study concluded that the students with belief that they could utilize computers had lower anxiety in online mathematics learning.

According to (Arens et al., 2021), the relationship between mathematics and self-efficacy, in this case computer self-efficacy, was a unidirectional relationship, meaning that the higher the computer self-efficacy, the higher the student's ability to do each mathematics test, and vice versa.

Self-efficacy contributes greatly to how students responded to mathematical problems. The students with high self-efficacy tended to try various ways to overcome and solve mathematics problems. They did not rely on the teacher's explanation, but exploring other alternative sources of learning mathematics. In contrast, students with medium and low self-efficacy hesitated to find solutions to

mathematical problems. Self-confidence that exists in the students contributed greatly to the students' positive attitudes dealing with mathematics. problems. The lack of self-confidence over a long period of time may form mathematic anxiety.

Bandura (1997) found that people experienced fear when they were doubt in the activities they were conducting. (Compeau and Higgins, 1995) in (Naviera, 2017) found that self-efficacy played an important role in shaping individual emotions and behaviour. The students with higher self-efficacy used computers more often, enjoyed using them more, and were less afraid of computers. Further research was necessary to link self-efficacy with its antecedents and outcomes to fully develop the nominal configuration network.

IV. CONCLUSION

The results showed that all indicators in the mathematics anxiety variable was categorised into a medium average score with the highest average score ($\overline{x}$=3.14). It implied that the students' mathematics anxiety in online learning was at a moderate level, meaning that students were not fully confident in their ability in learning mathematics. Furthermore, the overall average score of computer self-efficacy was still moderate and the indicator of magnitude score the highest, (x 2.97). It implied that students were not fully confident and assured in their ability to use computer devices. Based on the results of the analysis using Pearson's Pruduct Moment, the correlation coefficient value was -0.193; p=0.006 (p<0.05), meaning that there was a very significant negative

relationship with a very weak correlation degree between computer self-efficacy and anxiety in facing mathematics lessons and vice versa.

This study was possibly used as a consideration for teachers and schools in designing teaching materials in mathematics subjects as interesting as possible and promoting problem solving, for example encouraging students to master the material by increasing the number of exercises and having a discussion in the form of videos. In addition, to increase students' computer self-efficacy, teachers was suggested giving assignments related to computer use, for example students are expected to make a simple video related to one of the materials in mathematics, so that students learn how to master mathematics and computer at the same time. Further research may focus on other factors that cause maths anxiety and factors that increase self-efficacy.

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