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The Relationship Between E-Learning And Student Mathematics Disposition During The Covid-19 Pandemic

Hubungan Antara *E-Learning* Dengan Disposisi Matematika Siswa Di Masa Pandemi Covid-19

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ABSTRAK

Situasi pandemi Covid-19, menginisiasi Kementerian Pendidikan dan Kebudayaan Republik Indonesia untuk mengeluarkan edaran tentang kegiatan Belajar Dari Rumah. Namun demikian, 92% siswa mengalami kesulitan saat melaksanakan pembelajaran daring, termasuk pelajaran matematika. Situasi tersebut andil terhadap dinamika minat belajar matematika siswa di masa pandemi covid-19 dan berpotensi memengaruhi disposisi matematika siswa itu sendiri. Penelitian ini bertujuan untuk mendeskripsikan hubungan antara *e-learning* dengan disposisi matematika siswa di masa pandemi covid-19. Penelitian ini menggunakan pendekatan kuantitatif dengan metode analisis data korelasi pearson, penelitian ini melibatkan subyek 28 siswa kelas XII Sekolah Menengah Kejuruan. Berdasarkan hasil penelitian, disposisi matematika siswa berbanding lurus dengan kualitas pembelajaran *e-learning* yang dilakukan. Dalam hal ini, di masa pandemi covid-19 siswa kelas XII OTP SMK Salafiyah Plumbon Kab. Cirebon memiliki disposisi matematika yang rendah disebabkan pembelajaran *e-learning* yang rendah pula. Berdasarkan hasil penghitungan terdapat hubungan disposisi matematika dengan pembelajaran *e-learning*, besar koefisien korelasinya yaitu 0,464 dengan signifikansi 0,013. Dengan kata lain, hubungan yang terbentuk antara disposisi matematika dan hasil belajar adalah cukup berarti untuk menunjukkan adanya hubungan antara *e-learning* dan disposisi matematika siswa. Penelitian ini dapat digunakan sebagai bahan evaluasi pembelajaran daring (*e-learning*) matematika di masa Pandemi Covid-19, dengan memerhatikan aspek disposisi matematika siswa, penelitian ini juga dapat menjadi landasan untuk penelitian disposisi matematika selanjutnya.

Kata Kunci : *e-Learning*, Disposisi Matematis, Pembelajaran Matematika

ABSTRACT

The Covid-19 pandemic situation, initiated the Ministry of Education and Culture of the Republic of Indonesia to issue a circular regarding Learning From Home activities. However, 92% of students experience difficulties when carrying out online learning, including mathematics. This situation contributes to the dynamics of students' interest in learning mathematics during the COVID-19 pandemic and has the potential to affect the mathematical disposition of students themselves. This study aims to describe the relationship between e-learning and students' mathematical dispositions during the covid-19 pandemic. This study uses a quantitative approach with the Pearson correlation data analysis method, this study involved 28 students of class XII OTP SMK Salafiyah Plumbon Kab. Cirebon. Based on the results of the study, students' mathematical dispositions are directly proportional to the quality of the e-learning learning carried out. In this case, during the Covid-19 pandemic, class XII OTP SMK Salafiyah Plumbon Kab. Cirebon has a low mathematical disposition due to low e-learning. Based on the calculation results, there is a relationship between mathematical disposition and e-learning learning, the correlation coefficient is 0.464 with a significance of 0.013. In other words, the relationship formed between mathematical dispositions and learning outcomes is significant enough to indicate a relationship between e-learning and students' mathematical dispositions. This research can be used as an evaluation material for online learning (e-learning) mathematics during the Covid-19 Pandemic, by paying attention to aspects of students' mathematical dispositions, this research can also be the basis for further research on mathematical dispositions.

Keywords : e-Learning, Mathematical Disposition, Mathematics Learning

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PRELIMINARY

Education is a series of activities that are intentional, structured, and planned so that individuals can change and develop (Winarso & Supriady, 2016). Based on Law no. 20 of 2003 regarding UUSPN in Article 3, it is explained that education is a conscious and planned effort to create a learning atmosphere and learning process. This is so that students can actively develop their potential to have spiritual strength, self-control, intelligence, intelligence, noble character, and skills that are needed by themselves in society. In the Indonesian education curriculum, one of the subjects that students must take is mathematics (Ganarsih, 2020). According to Yashinta & Arianti (2015), mathematics has a central role because it is the basis for other subjects. Even according to Mulia, Wardono, & Sunarmi (2016), mathematical ability is one of the keys to living in a society.

Mathematics is said to be a unique subject because it uses a lot of symbols, abstractions, and generalizations (Dubinsky, 2002). However, mathematics actually has a stereotype as a difficult subject (Siregar, 2017). This triggers a lack of interest in students' mathematics learning, and it also causes students' mathematical achievement to be unsatisfactory (Steele, 1997). It is proven by the ranking of TIMSS Indonesia, which is still in position 45 out of 50 participating countries. OECD (2016) released data showing the results of Indonesia's PISA achievement, which were again unsatisfactory because they were still ranked 62 out of 70 participating countries.

However, TIMSS (2012) itself states that a positive attitude and high achievement in mathematics cannot be separated. The two go hand in hand. With this, Ganarsih (2020) stated that student learning achievement is not influenced by cognitive abilities but is also influenced by affective factors of students themselves; self-confidence, motivation shown by interest, students' attitudes towards learning itself, and several other aspects of the mathematical disposition.

Katz et al. (2009) explained that the mathematical disposition is a desire to behave with full awareness (consciously), full of rules (often), and the presence of volunteerism (voluntary) to achieve a goal. These behaviors include self-confidence, persistence, curiosity, and flexible thinking. Meanwhile, Izzati (2017) states that mathematical

disposition is a positive attitude towards mathematics. Likewise, Herman (2005) states that the disposition of mathematics is a situation of students with self-confidence, responsibility, perseverance, patience, and willingness to find other alternatives when learning mathematics. On the other hand, according to Hutajulu et al. (2019), students' mathematical position is a curiosity, awareness, and dedication to think and do mathematically. According to Lestari & Yudhanegara (2018), mathematical disposition has several indicators, including; 1) Confidence in behaving in using mathematics in everyday life, solving problems, giving reasons, and communicating ideas, 2) Flexibility to investigate a mathematical idea and efforts to find other methods that are effective in solving problems, 3) Having an attitude and responsibility which is manifested in the persistence to complete each mathematical task that is owned, 4) Has a tendency of interest, curiosity, and ability to find solution ideas in doing mathematical tasks 5) Can do self-monitoring and self-reflection on the actions that have been taken, and 6) Provide an assessment of the application of mathematics to other situations in problems and everyday life.

Mathematical disposition has a broad influence on education and learning achievement. Izzati (2017) researched the effect of mathematical connection abilities and mathematical dispositions on learning outcomes of flat-plane geometry by other students. Sheikh Nurjati, Cirebon, Izzati found that connection abilities and dispositions had a positive effect on geometry learning outcomes. Meanwhile, Mahmudi & Saputro (2016) researched the analysis of the influence of mathematical disposition, creative thinking ability, and perception of creativity on mathematical problem solving abilities. Mahmudi & Saputro also found that mathematical disposition had a positive effect on creative thinking skills and mathematical problem solving abilities. There is also Sa'adah & Zhanty (2019) who stated that the results of their research found that mathematical disposition had a positive effect on students' critical thinking skills.

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On the other hand, many do not think that the corona virus (Covid-19) can spread throughout the world so that it becomes a pandemic, including spreading to Indonesia. Almost all aspects of life in Indonesia have been affected by this outbreak (Rizal, 2020). The world of education is no exception, which inevitably has to change the pattern of learning to online learning, starting from the PAUD age level to the tertiary level.

At first, the government stated that schools were closed from all forms of activity (Purnamasari, 2020). Then, the Ministry of Education and Culture issued Circular Letter Number 15 of 2020 regarding guidelines for conducting online learning processes during the Covid-19 emergency. The guidelines explain that the goal to be achieved during the COVID-19 pandemic is the implementation of the Home Learning Process (BDR) which can fulfill the rights of students. These rights include education services that continue to run during the emergency response period, protect students from the effects that may be experienced during the COVID-19 pandemic, and break the chain of spread and transmission of COVID-19 in educational units. In addition, it is also hoped that this BDR can provide full support for teachers, students, and parents in psychosocial matters. The Ministry of Education and Culture has also recommended more than 23 web pages that can be accessed by parents and teachers to support student learning resources while studying at home (Kemendikbud, 2020). The Learning from Home Process (BDR) in other words requires every level of education to shift face-to-face learning to online learning or e-learning. E-learning is a teaching and learning activity that utilizes technology in the process (Ratnasari, 2012). Meanwhile, according to Karwati (2014), e-learning is distance learning utilizing technology such as computers and the internet.

According to Yulita (2017), there are factors that can affect the effectiveness of e-learning, including the regularity of a discussion through e-learning, students' enthusiasm for discussing the material taught through e-learning, the opportunity to be active in e-learning activities, the existence of an effort development of positive abilities in the e-learning process, an interesting e-learning process, the use of e-learning can be used to learn other materials that are being or will be taught, and e-learning can also be an effective alternative method.

However, the facts about the e-learning process during the COVID-19 pandemic show that it is ineffective. The drastic change from face-to-face learning to e-learning

makes teachers and students unprepared. The discussion of a lesson becomes disorganized and monotonous, the opportunity for students to participate is limited, and students also have difficulty managing study hours, so students experience a decrease in learning motivation (Utami and Cahyono, 2020). Reporting from the UGM news page (2020), Subarsono found that 50% of students had problems doing online learning. The internet network is the main obstacle in implementing BDR during the Covid-19 pandemic. Even according to Wardi (2020), during his webinar, he stated that 92% had many problems when learning online. Purwanto et al (2020) that there are many obstacles experienced by students, teachers, and parents during this covid-19 pandemic.

Many obstacles experienced when conducting bold learning or e-Learning can certainly affect learning, including learning mathematics and mathematics for students at various levels of education. In this case, Vocational High School is one of the levels that experienced significant changes in the learning process. Characteristics of vocational school students struggling with many practices (Sofyan, 2008) must change the learning process into bold learning that is stagnant in cognitive development only. This makes vocational students vulnerable to boredom and decreased interest in learning (Nurlaili, 2021). This is crucial for vocational students, especially in mathematics, where students need mathematics learning to understand mathematics itself (Wilkerson-Jerde & Wilensky, 2011).

The things above initiated this research, entitled: "The Relationship Between e-Learning and Students' Mathematical Disposition in the Covid-19 Pandemic Period". With research questions, is there a relationship between e-learning learning and students' mathematical dispositions?

METHODS

The approach used in this research is quantitative with survey method. Survey is a research method using questionnaires as data collection (Bungin, 2006) The research subjects were 28 students of class XII of the Department of Automation and Office Governance at SMK Salafiyah Plumbon Kab. Cirebon. The sampling technique used is saturated sampling. Saturated sampling is a technique in which all members of the population are used as samples (Teddlie, 2007).

Questionnaire (questionnaire) totaling 37 statements per variable and given to all subjects. The research instruments in this study are; the related variable (Y) is the mathematical disposition, and the independent variable (X) is the response to e-learning. On the

dependent variable grid (Y), there are seven different indicators with 37 statements. Each is in the form of 22 positive statements and 15 negative statements. Meanwhile, on the independent variable grid (X), there are three different indicators with 10 statement items in the form of 5 positive statements and five negative statements. The research instrument for variable X and variable Y passed expert judgment validation, then the validity and reliability were calculated to determine the validity of the research instrument used. The data analysis technique used in this study is Pearson correlation.

RESULTS AND DISCUSSION

Based on the distribution of questionnaires and documents to 28 students, the results of the research can be explained as follows:

3.1 Mathematical Disposition

Data on students' mathematical dispositions were obtained from the results of distributing questionnaires to 28 students. In this study, researchers used three criteria for mathematical dispositions, namely low, medium, and high, because the data taken was normally distributed, which was divided into six parts or six standard deviation units (Azwar, 2012). Researchers used a Likert scale with a scale of 1-4. The number of items on the scale is 37 and categorizes the subjects into three groups, namely low, medium, and high. To categorize mathematical dispositions into three criteria, the researcher uses the following guidelines by Azwar (2012):

Tabel 1. Guidelines for Students' Mathematical Disposition Level

Criteria	Interval
Low	$X < M - 1 \text{ SD}$
Medium	$M - 1 \text{ SD} \leq X < M + 1 \text{ SD}$
High	$M + 1 \text{ SD} \leq X$

Based on the above guidelines, the results of the categorization are as follows:

Tabel 2. Category Level of Student's Mathematical Disposition

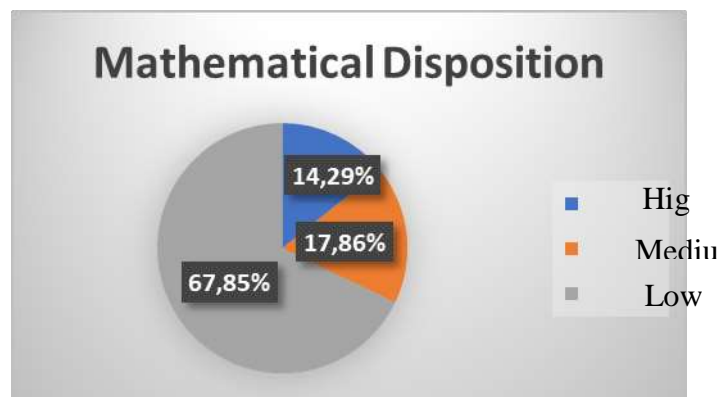
Criteria	Interval
Low	$X < M - 1 \text{ SD}$
	$X < 92,5 - 18,5$
	$X < 74$
Medium	$M - 1 \text{ SD} \leq X < M + 1 \text{ SD}$
	$92,5 - 18,5 \leq X < 92,5 + 18,5$
	$74 \leq X < 111$
High	$M + 1 \text{ SD} \leq X$
	$92,5 + 18,5 \leq X$
	$111 \leq X$

Based on Table 2, the criteria for low mathematical disposition have a score of < 74, moderate 74-110 and high 111. Meanwhile, based on the results of the questionnaire, the minimum score is 51 and the maximum value is 112 with the data distribution as in Table 3.

Tabel 3. Mathematical Disposition Frequency Data Distribution

Disposition	F	Presentase
High	4	14,29%
Medium	5	17,86%
Low	19	67,85%
Total	28	100%

Based on Table 3 above, it can be seen that out of 28 students, 4 had a high disposition, 5 had a moderate disposition and 19 others had a low disposition..



Gambar 1. mathematical disposition diagram

The high dispositions that students have, as depicted in Figure 1, are; 1) Confidence in behaving in using mathematics in everyday life, solving problems, giving reasons, and communicating ideas, 2) Flexibility in an effort to investigate a mathematical idea and efforts to find other methods that are effective in solving problems, 3) Having an attitude and responsibility that is manifested in the persistence to complete every mathematical task that is owned, 4) Has a tendency of interest, curiosity, and ability to find a solution idea in doing math tasks 5) Can carry out self-monitoring and reflection on the actions that have been taken, and 6) Provide an assessment of the application of mathematics to other situations in mathematics and everyday life, and 7) Give an appreciation of mathematical behavior in cultural aspects of life. The high points of students against these indicators indicate that some students have a good attitude towards mathematics.

On the other hand, Lestari, Suharto, and Fathillah (2016) that a high mathematical disposition has an effect on high student learning outcomes. High student dispositions are also closely related to students' connection and representation abilities. Mandur, Sadra, and Suparta (2016) Through high mathematical dispositions, students' connection, and representation abilities can encourage student achievement. This shows that a high mathematical disposition plays an important role in student learning achievement directly and indirectly.

On the other hand, students who have low mathematical disposition do not have all or part of the indicators of mathematical disposition. In other words, students who have low mathematical dispositions in Figure 1 show 1) There is no self-confidence in behaving in using mathematics in everyday life, solving problems, giving reasons, and communicating ideas, 2) Not having a flexible attitude in an effort to investigate an idea. mathematics and efforts to find other methods that are effective in solving problems, 3) Do not have the attitude and responsibility which is manifested in the persistence to complete every mathematical task they have, 4) Do not have a tendency of interest, curiosity, and ability to find a solution idea in performing math tasks 5) Unable to monitor and reflect on the actions that have been taken, and 6) Unable to provide an assessment of the application of mathematics to other situations in mathematics and daily life problems, and 7) Unable to give appreciation to mathematical behavior in the cultural aspects of life. The low points of students against these indicators indicate that some students have a bad attitude towards mathematics..

The percentage shown for the low disposition is 67.85%, while the percentage shown for the moderate disposition is 17.86%, and the high one is 14.29%. This means that the students of class XII OTP SMK Salafiyah Plumbon Kab. Most of Cirebon has a low mathematical disposition towards e-learning because the dominant percentage is a low mathematical disposition.

3.2 E-Learning responses

In this study, researchers used three criteria for e-learning, namely low and high, because the data taken were normally distributed. Researchers used a Likert scale with a scale of 1-5. The number of items on the scale is ten and categorizes the subject into two groups, namely low and high. To categorize e-learning into two criteria, the researchers used the following guidelines by Azwar (2012):

Tabel 4. Guidelines for Students' E-Learning Response

Criteria	Interval
Low	$X < M$
High	$X \geq M$

Based on table 4 above, the results of the categorization are as follows:

Tabel 5. Distribution of Students' E-Learning Response Frequency Data

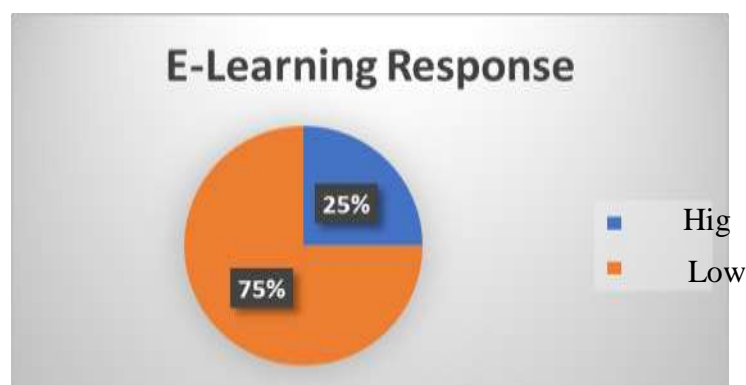
Criteria	Interval
Low	$X < M$
	$X < 30$
High	$X \geq M$
	$X \geq 30$

Based on the calculation results, the criteria for e-learning learning are low, which has a score of < 30 , and high 30. Thus, based on the questionnaire response value of e-learning, the minimum score is 21, and the maximum value is 35 with data distribution, as shown in Table 6.

Tabel 6. Students' E-Learning Response Frequency Data Distribution

<i>e-Learning</i>	F	Percentage
High	7	25%
Low	21	75%
Total	28	100%

Based on Table 6, it can be seen that of the 28 students who took part in e-learning, seven students had a high response, and 21 others had an inadequate response to e-learning.

**Gambar 2.** E-Learning Response Diagram

The response of high e-learning learning depicted in Figure 2 is the quality of e-learning. It is shown by the students' interest in e-learning learning. A good answer or a high response indicates that e-learning has good learning quality. The good quality of e-learning shows that 1) Students find it helpful in understanding math material, 2) Students find new knowledge from learning using e-learning, 3) Students get the flexibility to learn mathematics anywhere, and anytime, 4) Students can keep communicating well with friends and teachers, and 5) Students are more motivated to look for other sources on the internet in completing math assignments. Vice versa, a response that has not been good or an inadequate response shows that e-learning has low learning quality. Good quality of e-learning shows that students do not have some or all of these indicators.

The percentage shown for e-learning learning responses is high by 25%, while the percentage for low learning responses is 75%, which means that e-learning learning in class XII OTP SMK Salafiyah Plumbon Kab. Most of Cirebon has a low response or low quality of e-learning because the dominant percentage is the low response.

3.3 Relationship of e-Learning with Mathematical Disposition

Based on the study results, to determine the relationship between e-learning and mathematical disposition, Pearson's correlation was calculated with the help of the SPSS program. Here is the result of the calculation.

Tabel 3. Results of Testing the Relationship between Mathematical Disposition and e-Learning

rcount	Sig.	$R_{\text{table (df=28) for } \alpha = 0,05}$	Conclusion
0,464	0,013	0,378	Reject H_0

Pengujian hipotesis pada Tabel 3 di atas dengan menggunakan uji korelasi Pearson dilakukan untuk mengetahui hubungan Pembelajaran *e-learning* dengan disposisi matematika. Dalam penelitian korelasi terdapat dua jenis hipotesis, yaitu H_0 dan H_1 . H_0 memiliki arti bahwa tidak ada hubungan antara dua variabel ($R=0$) dan H_1 memiliki arti bahwa ada hubungan antara dua variabel ($R \neq 0$).

Testing the hypothesis in Table 3 above using the Pearson correlation test to determine the relationship between e-learning learning and mathematical disposition. In correlation research, there are two types of hypotheses, namely H_0 and H_1 . H_0 means that there is no relationship between the two variables ($R=0$) and H_1 means a relationship between the two variables ($R \neq 0$).

By using the Personnel correlation test, the r_{count} value is 0.464 with a significance value = 0.013. r_{table} with degrees of freedom ($df=28$) for $\alpha = 0.05$, the value is 0.378. The next step is a comparison, where the value of r_{count} is greater than r_{table} ($0.464 > 0.378$), and besides that the significance value obtained is smaller than $\alpha = 0.05$ ($0.013 < 0.05$) so it can be concluded that H_0 is rejected. If H_0 is rejected then H_1 is accepted. This statement means that there is a relationship between two variables, namely e-learning and mathematical disposition. So from this test it can be concluded that there is a significant relationship between e-learning learning and mathematical disposition. A positive correlation coefficient indicates that the relationship formed between e-learning learning and mathematical disposition is positive. This shows that the lower the quality of e-learning, the lower the students' mathematical disposition, and vice versa. The correlation coefficient formed is 0.464. This correlation category is in the medium category (0.40 - 0.599). That is, the relationship formed between mathematical disposition and learning outcomes is quite meaningful

The results showed that four students or 14.29% students had a high mathematical disposition, five students, or 17.86%, had a moderate mathematical disposition, and the remaining 19 students, or 67.85% students, had a low mathematical disposition. Meanwhile, data on student responses to e-learning shows that 21 students, or 75% of students, choose e-learning in the low category, and seven students or 25% of students choose e-learning in the high category.

The e-learning model is widely applied during the current covid-19 pandemic, based on data which shows that the quality of e-learning learning is directly proportional to the disposition of mathematics. In this case, the low disposition of students is caused by the lack of quality e-learning. Thus, to achieve the achievement of good mathematics and mathematics learning, an effort so that e-learning can continue to be developed so that it is more effective.

CONCLUSION

Based on the results of this study, it can be concluded that during the current covid-19 pandemic, class XII students at one of the Cirebon City Vocational Schools have a low mathematical disposition due to the low quality of e-learning as well. Based on the calculation results, there is a positive relationship between mathematical disposition and e-learning learning, the correlation coefficient is 0.464 with a significance of 0.013. The

factors that may be the cause of the ineffectiveness of e-learning may vary and further research is needed.

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