



Learning Motivation, Self-Regulated Learning, and Mathematical Communication Skills Verbal and Written by Students' in Learning Mathematics During The Covid-19 Pandemic

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Abstract

This study aims to determine (1) how the learning motivation, self-regulated learning and verbal mathematical communication skills of students; and (2) how are students' learning motivation, self-regulated learning and mathematical communication skills in writing mathematics learning during the covid-19 pandemic. The research used is a mixed method type Sequential Exploratory Design. The population is students of class XI IPA SMA Negeri 1 Pringsewu. Data was collected using questionnaires, observations, documentation and written mathematical communication skills tests. The results of the study show that learning mathematics during the Covid-19 pandemic where learning motivation and self-regulated learning directly affect students' written mathematical communication skills, but verbal mathematical communication skills really need to be considered because they are still in the low category.

Abstrak

Penelitian ini bertujuan untuk mengetahui (1) bagaimana kemampuan komunikasi matematis secara lisan peserta didik; dan (2) bagaimana motivasi belajar, kemandirian belajar dan kemampuan komunikasi matematis secara tulis peserta didik dalam pembelajaran matematika pada masa pandemi covid-19. Penelitian yang digunakan adalah mixed methods tipe Sequential Exploratory Design. Populasi dalam penelitian ini adalah peserta didik kelas XI IPA SMA N 1 Pringsewu. Pengumpulan data menggunakan kuesioner, observasi, dokumentasi dan tes kemampuan komunikasi matematis tulis. Hasil penelitian menunjukkan pembelajaran matematika selama pandemi Covid-19 dimana motivasi belajar dan kemandirian belajar mempengaruhi secara langsung kemampuan komunikasi matematis secara tulisan peserta didik, tetapi kemampuan komunikasi matematis secara lisan sangat perlu di perhatikan karena masih tergolong dalam kategori rendah.

Keywords: Learning Motivation, Self-Regulated Learning, Mathematical Communication Verbal and Written.

INTRODUCTION

Education is a reciprocal process between teachers, students, learning resources

and learning support by involving various other educational factors to achieve educational goals (Hamid, 2013:34). In 2020 the whole world experienced an outbreak

namely the Corona virus disease (Covid-19) pandemic. The impact of the Covid-19 pandemic has not only occurred in the health sector but also in the field of education, where several countries have decided to temporarily close schools for face-to-face learning.. To overcome these problems, it is necessary to change the design of the model in learning activities as an effort to reduce the spread of the Covid-19 virus (Purwanto et al., 2020:1). The importance of the role of education, the government tries to maintain learning activities during the Covid-19 outbreak. Based on this, the Ministry of Education and Culture issued a circular letter Number 4 of 2020 regarding the implementation of education policies during the emergency period of the spread of Covid-19 which stated that temporarily learning was carried out online from home by utilizing all technology to support learning. Based on the circular, each school suddenly implements online learning activities by utilizing various application features that at least support the learning carried out. This online learning can make teaching and learning activities not hindered by time and place (Shukla et al., 2020). The use of this technology is considered very helpful in carrying out learning during physical distancing during the Covid-19 pandemic (Pakpahan & Fitriani, 2020). In addition, the current generation is very close to technology so it is easier to adapt to online learning (Hastini et al., 2020).

In fact, there are many obstacles experienced during online learning during the Covid-19 pandemic. Due to inadequate networks, online learning does not work well (Hastini et al., 2020). The use of internet quotas also creates new expenses that can be a problem for some parents of students who are experiencing financial difficulties. In addition, the obstacles that occur are the readiness of

teachers and students in carrying out online learning activities. Online learning teachers demand to provide stimuli that can increase students' self-regulated learning and students are not ready to carry out online learning (Morgan, 2020). Strengthening this statement with the results of his research which found that the many tasks given by the teacher made students feel stressed in undergoing online learning (Chatherine, 2020). This agrees with the research conducted and it is concluded that during learning during the Covid-19 era students lost opportunities including: (1) obtaining positive social feedback about students' mathematical behavior and (2) studying social aspects of solving math problems, such as strategies what is socially accepted and supported (Uegatani et al., 2021).

But during this pandemic, schools have no other choice to carry out the learning process, namely online learning. Online learning is carried out using WhatsApp, Google Classroom, Zoom and other applications that are able to support learning activities during this outbreak. Online learning that is carried out does not provide an inefficient time space for students because students can only observe all learning activities independently at home. Meanwhile, the tasks given by the teacher are carried out by sending the answers in the form of photos or emails that have been provided (kompas.com, news dated 12/08/2020). During online learning in the Covid-19 era, solving problems such as daily assignments and assessments requires Self-Regulated Learning and high learning motivation to be carried out individually by students. Thus, providing correct and systematic solutions and having the will to solve problems in finding solutions, being responsible in the learning process, and having confidence in every learning process.

Self-Regulated Learning is an active and participatory learning process in developing each individual's ability that is not tied to learning attendance, face-to-face meetings in class, and everyday life with schoolmates (Yamin, 2013). Self-regulated learning is self-actualization to control oneself in order to get a self-satisfaction for the learning process carried out, a student who has good self-regulated learning will have good self-control and awareness in learning such as having their own learning strategy, after getting a result will be compared with a selected standard (U. Sumarmo, 2005). In addition, individuals who have Self-Regulated Learning are individuals who are active in metacognition, motivation, and behavior in the learning process (Zimmerman, et al., 1996). Therefore, self-regulated learning is very necessary so that students have the responsibility to regulate and discipline themselves, in addition to developing abilities on their own volition, self-regulated learning in learning to obtain information does not only depend on the teacher or face to face in class, but on utilization by using libraries, other sources or can form study groups (Mashuri, 2012). Self-regulated learning is a dynamic process in which students build knowledge, skills, and attitudes when learning context-specific so that students have various learning strategies, experience applying them in various situations, and are able to reflect. Independent learning includes three stages of activities, namely before, during and before carrying out learning tasks (Knain, 2000). Bandura defines self-regulated learning as a condition in which individuals who learn as controllers of their own learning activities, monitor motivation and academic goals, manage human and material resources, and become behaviors in the decision-making process and implementers in the learning process

(Filho, 2001).

Academic achievement is a complex relationship between individual abilities, self-perception, task assessment, success expectations, cognitive strategies, self-regulation, gender, parenting style, socioeconomic status, performance and individual attitudes towards school (Clemons, 2008). This shows that individual academic achievement is determined by two factors, both external and internal. This is in accordance with the opinion of Chung (2002) that learning is not only controlled by external aspects, but is also controlled by internal aspects, one of which is self-regulated learning. Therefore, learning must be understood as an active and constructive process (Montalvo & Tores, 2004). According to Stone, Schunk & Swartz (Cobb, 2003) there are three factors that influence self-regulated learning, namely self-efficacy, learning motivation and learning goals. Self-efficacy refers to a person's belief about his ability to learn or perform skills at a certain level (Wang, 2004). Meanwhile, according to Bandura (Cobb, 2003) motivation is something that moves individuals towards goals, with the hope that they will get the results of their actions and the self-confidence to do so. And Objectives are criteria used by individuals to monitor their learning progress. The three factors mentioned above, namely goals, motivation and self-efficacy are interrelated with self-regulated learning. Self-efficacy reflects belief in one's own ability to complete tasks, which will affect goals (whether oriented to learning or performance goals). Furthermore, high self-efficacy will motivate individuals to increase self-regulation, so that individuals can learn by implementing more self-efficacy strategies -regulated learning, which ultimately affects academic achievement.

In addition to self-regulated learn-

ing, learning motivation is needed by students to be able to complete the tasks given to be completed independently at home with current conditions. Motivation is defined as a series of efforts to provide certain conditions, so that someone does something and if he doesn't like it, he will try to avoid feelings of dislike (Sadirman, 2018:75). The function of motivation is to encourage behavior. Without motivation, there will be no action like learning. Motivation also functions as an influence that will mobilize one's actions to achieve the desired goal. Motivation also functions as a driver. The level of motivation will affect the speed at which students learn. Motivation is closely related to the goals to be achieved, so that motivation also affects the activities to be carried out (Hamalik, 2008: 161). In this regard, learning motivation serves to encourage people to act, determine the direction of action, and select which actions to take. In addition, learning motivation can function as a driver of effort and achievement of learning achievement (Sadirman, 2018:75).

These two affective aspects are very supportive of how students can communicate both verbal and in writing what they do during the learning that is carried out, especially in learning mathematics. Mathematics as a communication tool is needed both in education and in everyday life. As a language, mathematics has advantages over other languages, including the symbols used only have one meaning (Haji, 2012). Mathematical communication is the ability of students to express mathematical ideas both verbal and in writing. The ability to read and write mathematical ideas is the initial ability needed to be able to understand well a mathematical idea. Writing skills affect the understanding of mathematical ideas while the results of writing are evidence of how well students under-

stand the concepts being taught (NCTM, 2000:268). Mathematical communication in learning mathematics is a tool to measure understanding and reflect students' mathematical understanding. Associated with communication activities in learning mathematics, communication skills are one of the abilities that need to be considered in connection with the success and efficiency of a learning process. The assessment of communication skills includes the ability of students to express and interpret mathematical ideas verbal and in writing (Yuniarti, 2014). Verbal mathematical communication is the ability of students in discussion activities, while written mathematical communication is the ability of students to use vocabulary, both notation and mathematical structures in connecting and understanding ideas to solve given problems.. (Pujiastuti et al., 2014).

Learning motivation, self-regulated learning and communication skills are three interrelated aspects. Mathematical communication needs to be developed to students for two important reasons. First, mathematics is not just a thinking tool to get ideas and solutions. Second, as a social activity in the learning process and a means of interaction between students and students and educators with students. Self-regulated learning is the most important factor in the student's learning process that affects mathematical communication skills. This agrees with the research results which show that the low mathematical communication skills of students are influenced by low self-regulated learning (Sumartono & Karmila, 2017). In addition, learning motivation has an influence on communication skills because motivation is important for the mathematics learning process that can develop activities that will be carried out by students. Motivation is also important for students in

learning because motivation is a driving force where students can be enthusiastic in learning, where if the motivation grows then the communication skills will be good but if the motivation is reduced then the communication skills will also be less good (Abdi, 2018).

METHODS

The research used is a mixed methods research with the type of research is Sequential Exploratory Design. The population of this study were students of class XI IPA SMA N 1 Pringsewu. Data collection using cross sectional survey technique with cluster sampling taken online. The selected class is class XI IPA 1 with 34 students. The instruments used were a questionnaire to determine learning motivation and self-regulated learning, observations to find out how students' verbal mathematical communication in learning mathematics during the Covid-19 pandemic, documentation to determine the mathematics learning process carried out during the Covid-19 pandemic and three questions, written mathematical communication skills test in the form of an essay.

Learning Motivation Instruments and Self-Regulaed Learning

The learning motivation instrument is based on six indicators, namely: (1) belief in self-ability; (2) learning strategies that activate students; (3) the value of learning science (4) performance objectives; (5) achievement goals; and (6) learning environment stimulation (Tuan et al., 2005). The learning motivation questionnaire uses a Likert scale with the criteria of strongly disagree, disagree, don't know, agree, and strongly agree. Each criterion is weighted 1, 2, 3, 4, and 5.

The self-regulated learning instrument is based on ten indicators, namely: (1) goal setting and planning; (2) organizing and transformation; (3) record keeping and monitoring; (4) environmental management; (5) search for information; (6) practice and memorize; (7) reviewing records; (8) seeking social assistance; (9) self-consequences; (10) self-evaluation (Zimmerman, et al., 1996). The self-regulated learning questionnaire uses a differential semantic scale with scoring gradations from very negative to very positive.

Mathematical Communication Skills Instrument

Mathematical communication instruments are based on three indicators, namely: (1) the ability to convey mathematical ideas verbally and in writing and

Table 1. Indicators of Oral Mathematical Communication Ability

No	Mathematical Communication Aspect	Verbal Mathematical Communication Indicator
1	Ability to express mathematical ideas verbally and demonstrate and draw visually	a. Accuracy in conveying material to friends in learning b. Clarity demonstrates images in clear and easy-to-understand language.
2	The ability to use terms, mathematical notation and structures to convey mathematical ideas and describe relationships with situational models.	a. The accuracy of reading mathematical notation in discussion activities b. Explain the material verbal using language that is easy to understand
3	The ability to understand, interpret and evaluate mathematical ideas either verbal or in other visual forms.	a. Understanding the material explained by other friends in the study discussion b. Accuracy in giving opinions in discussions. c. Provide input with clear and accurate theory

Table 2. Indicators of Writing Mathematical Communication Ability

No	Mathematical Communication Aspect	Writing Mathematical Communication Indicator
1	Ability to express mathematical ideas through writing and visually demonstrating and drawing	a. Using ideas and writing down their thoughts to solve problems. b. Interpret mathematical ideas in the form of pictures clearly and completely.
2	The ability to use terms, mathematical notation and structures to convey mathematical ideas and describe relationships with situational models.	a. Using representations to express mathematical concepts in writing. b. Interpret the solutions found by writing.
3	The ability to understand, interpret and evaluate mathematical ideas either verbal or in other visual forms.	a. Write solutions using mathematical terms and notations appropriately to present ideas in solving existing problems. b. Presenting his opinion in the form of solving problems written on the answer sheet in a structured way.

express them visually, (2) the ability to understand and evaluate mathematical ideas verbally, written in other visual forms, (3) the ability to use terms, notation and mathematical structure in conveying ideas (NCTM, 2000). Indicators of verbal and written mathematical communication skills are described in Table 1 and Table 2.

Data analysis technique

Before analyzing the data, the researcher first grouped the questionnaire data on learning motivation and self-regulated learning into groups of levels owned by students, namely high, medium and low groups. This grouping is based on normal assumptions, with the following conditions: (a) High group if: $\text{Score} \geq \bar{x} + (0,5)s$, (b) Medium group if: $\bar{x} - (0,5)s \leq \text{Score} < \bar{x} + (0,5)s$; and (c) low group if: $\text{Score} < \bar{x} - (0,5)s$. (Budiyono, 2016). It should be remembered that the mixed method as defined is a combination of quantitative and qualitative research and analysis so that more comprehensive, valid, reliable, and objective data will be obtained (Sugiyono, 2019). Data analysis techniques in this study are analyzing qualitative data and analyzing quantita-

tive data. Qualitative data analysis using time triangulation and quantitative data analysis techniques using descriptive statistics, simple regression analysis and multiple regression analysis.

RESULTS AND DISCUSSION

This study aims (1) to find out how students' learning motivation, self-regulated learning and verbal mathematical communication are in learning mathematics during the covid-19 pandemic; and (2) to find out how the students' learning motivation, self-regulated learning and mathematical communication in writing are in learning mathematics during the covid-19 pandemic. Knowing how students' learning motivation, independence and mathematical communication are verbal and written in mathematics learning during the Covid-19 pandemic, first the research looks at the level of learning motivation and self-regulated learning of students by giving a questionnaire. Questionnaire scores are grouped based on the data obtained at Table 3.

Table 3. Level of Learning Motivation and Self-regulated learning of Class XI Science 1 Students

No	Aspect	Tiers	Amount	Percentage (%)
1	Learning Motivation	High	9	26,47
		Medium	17	50
		Low	8	23,53
2	Self-regulated learning	High	11	32,35
		Medium	15	44,12
		Low	8	23,53

Based on Table 3, the researchers then determined the students who were used as research subjects with a balanced level of aspects of learning motivation and Self-Regulated Learning as follows: (1) A total of 7 students with high level of learning motivation and Self-Regulated Learning; (2) A total of 10 students with moderate level of learning motivation and Self-Regulated Learning; and (3) A total of 8 students with low level of learning motivation and Self-Regulated Learning. The determination of the 25 research subjects to be used as subjects to be asked in knowing the ability of verbal mathematical communication in learning mathematics during the covid-19 pandemic on students' learning motivation and self-regulated learning.

The Influence of Learning Motivation, Self-regulated learning on Oral Mathematical Communication of Students in Mathematics Learning During the Covid-19 Pandemic

The results of researchers' observations at SMA N 1 Pringsewu on mathematics learning during the Covid-19 pandemic showed that the learning process was carried out online by utilizing various supporting applications such as WhatsApp, Google Classroom, Quizizz, Google Meet, Zoom, YouTube and other teaching materials made by teachers in school teacher deliberations forum. This

research was conducted in class XI IPA 1 with a learning schedule every Monday, at 07.30-09.30 where learning is done online. The results of learning observations carried out on teachers include: First, at 07.15, providing information to students via WhatsApp class by informing them to fill out the attendance list in the Google Classroom with a link to the Google form that has been prepared in time 10 minutes, after 10 minutes the teacher checks the absence of students in filling out the attendance list by providing information back on WhatsApp class within 5 minutes by directly providing information to students to join the google meet link that has been prepared. Second, at 07.30 the learning was carried out by opening the lesson with greetings, asking how the students were and conveying the basic competencies and objectives to be conveyed by displaying it on google meet so that all students could read it. Third, at 07.45 the teacher asks students to open the learning resources that have been determined in the teaching materials within 25 minutes while asking students to make conclusions about what they read, then in discussion with students the teacher asks several students to convey conclusions from the information they read. from literacy. The results of the delivery of information are used as a review of how students' mathematical communication skills verbal. Third, at the end of the lesson at 09.15 the teacher provides information to re-understand the material that has been discussed in this lesson and increases to do practice questions and prepare for the next lesson.

The results of students' oral mathematical communication skills in terms of motivation and self-regulated learning are presented in Table 4.

Table 4. Results of the Analysis of Students' Oral Mathematical Communication During Learning

No	Verbal Mathematical Communication Indicator	Category Number and Percentage			
		SB	B	CB	KB
1	a. Accuracy in conveying material to friends in learning	2 (8%)	5 (20%)	10 (40%)	8 (32%)
	b. Clarity demonstrates images in clear and easy-to-understand language.	2 (8%)	4 (16%)	8 (32%)	11 (44%)
2	a. The accuracy of reading mathematical notation in discussion activities	5 (20%)	6 (24%)	8 (32%)	6 (24%)
	b. Explain the material verbal using language that is easy to understand	4 (16%)	5 (20%)	6 (24%)	10 (40%)
3	a. Understanding the material explained by other friends in the study discussion	3 (12%)	4 (16%)	8 (32%)	10 (40%)
	b. Accuracy in giving opinions in discussions.	2 (8%)	4 (16%)	7 (28%)	12 (48%)
	c. Provide input with clear and accurate theory	1 (4%)	2 (8%)	8 (32%)	14 (56%)
Total		10,86%	17,14%	31,43%	40,57%

Table 4 shows that verbal mathematical communication skills during the online learning process with levels of self-regulated learning and motivation based on high, medium and low levels of teacher assessment results on oral communication skills in the assessment are quite good and not good. This shows that verbal mathematical communication is still classified as poor in learning during the COVID-19 pandemic.

The Influence of Learning Motivation, Self-regulated learning on Students' Written Mathematical Communication in Learning Mathematics During the Covid-19 Pandemic

The first quantitative analysis process is to review the differences in the average written mathematical communication of students with learning motivation and self-regulated learning in the high, medium and low categories. The results of the analysis are presented in Table 5.

Table 5. Results of Analysis of Students' Writing Mathematical Communication with Learning Motivation and Self-regulated learning in High, Medium and Low Categories

Ability	Aspects of Learning Motivation and Self-regulated learning	Mean
Mathematical Communication Write	Hihg	27,12
	Medium	22,34
	Low	18,11

Based on table 5 above, it is known that the average written mathematical communication ability of students based on the level of learning motivation and high learning independence is 27.12, the average written mathematical communication ability of students based on the level of learning motivation and self-regulated learning is 22.34 while the average The average written mathematical communication ability of students based on the level of learning motivation and self-regulated learning is low at 18.11. The average results show that there is a difference in the average written mathematical communication of students with learning motivation and self-regulated learning in the high, medium, and low categories.

The second quantitative analysis process is to review the influence be-

tween learning motivation and self-regulated learning with mathematical communication in writing. The results of the analysis are presented in Table 6.

Table 6. Results of Analysis of the Effect of Learning Motivation and Self-regulated learning with Mathematical Communication in Writing

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1,069	2	,214	3,277	,001 ^b
1 Residual	2,543	22	,065		
Total	3,612	24			

The output results in the ANOVA section provide information about the influence between learning motivation and self-regulated learning with mathematical communication in writing. The results obtained the value of sig. 0.001 less than 0.05 thus the hypothesis is accepted that there is a joint influence of learning motivation and self-regulated learning with mathematical communication in writing. Self-Regulated Learning of students must have the provision of learning motivation. The influence of motivation plays an important role in starting, maintaining, implementing the learning process and evaluating learning outcomes. In addition, learning motivation can also guide students in making decisions, supporting completing tasks in such a way that learning objectives are achieved. In addition, independence is an active form of students looking for problem solving that is given as a result of motivational encouragement in learning (Nurhayati, 2011). In addition, students with high self-regulated learning can be predicted to have high learning motivation, conversely, students with low self-regulated learning can be predicted to have low learning motivation (Fauziah, et al., 2021). This shows that the relationship between learning motivation and independence is the impact of the influence on students' written mathematical

communication skills.

The third process of quantitative analysis is to review the influence between learning motivation and mathematical communication in writing. The results of the analysis are presented in Table 7.

Table 7. Results of Analysis of the Effect of Learning Motivation with Mathematical Communication in Writing

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2,051	2	,079	4,579	,000 ^b
1 Residual	,137	22	,137		
Total	2,188	24			

The output results in the ANOVA section provide information about the influence between learning motivation and written mathematical communication. The results obtained the value of sig. 0.000 is less than 0.05, thus the hypothesis is accepted that there is an influence of learning motivation on written mathematical communication. Motivation is a change in a person's attitude which is characterized by a "feeling" which is preceded by a response to a goal. Motivation is not a product but a process that cannot be observed directly, but can be seen from the actions taken, for example task choice, effort and persistence. (Djamarah, 2010). So that learning motivation is an encouragement or change in a person's energy with the aim of getting something to be achieved. The results of the analysis show that there is a positive influence between learning motivation and written mathematical communication skills (Abdi, 2018).

The fourth process of quantitative analysis is to review the influence between Self-Regulated Learning and mathematical communication in writing. The results of the analysis are presented in Table 8.

Table 8. Results of Analysis of the Effect of Self-Regulated Learning with Mathematical Communication in Writing

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3,602	2	,086	3,167	,000 ^b
1 Residual	,051	22	,051		
Total	3,653	24			

The output results in the ANOVA section provide information about the influence between Self-Regulated Learning and written mathematical communication. The results obtained the value of sig. 0.000 is less than 0.05, thus the hypothesis is accepted that there is an influence of self-regulated learning with written mathematical communication. Self-Regulated Learning has an important role in learning because it does not depend on the teacher, so that the learning process is more optimal. This can encourage the improvement of students' mathematical abilities (Fahradina, et al., 2014). Furthermore, student self-regulated learning is the freedom to learn with the ability of students to organize their own learning activities, on their own initiative and responsibly, without always depending on others. Self-regulated learning is also one aspect where students are required to believe in their abilities. In addition, this self-regulated learning can train students to be able to solve non-routine questions. In other words, if students have good self-regulated learning, their mathematical communication skills will also be good (Yani, 2017).

Based on the results of data analysis and discussions that have been carried out, learning motivation, self-regulated learning and mathematical communication skills are important parts to be considered in learning. But not only that, there are still many shortcomings that researchers have done, namely by reviewing how the attitudes of students after learning in the Covid-19 era ended

so that the attitudes of students in learning must be considered and optimized by applying learning models or other important aspects that are appropriate in the learning process. will be done.

CONCLUSION

The results of data analysis during online learning showed that students' verbal mathematical communication skills still need to be considered and improved, while students' verbal mathematical communication skills during learning are still not good or low. Teachers at least provide more space for interactive discussions in learning using google meet. Furthermore, the results of quantitative data analysis carried out by covering: (1) determining the average written mathematical communication ability based on the level of self-regulated learning and motivation gave different results where verbal mathematical communication skills with learning motivation and self-regulated learning in the high category level were better than with learning motivation and self-regulated learning in the medium and low category levels; (2) the results of data analysis in determining the effect together, namely learning motivation and self-regulated learning with written communication skills using ANOVA gave significant results by showing several relevant theories or research; (3) the results of data analysis in determining the effect of learning motivation on written communication skills and self-regulated learning with written communication skills using ANOVA provide significant results by showing several relevant theories or research, this is indicated by various training assignments given by the teacher as a homework assignment, so that students are accustomed to doing assignments to improve written mathematical communication skills while main-

taining learning motivation and self-regulated learning during learning during the covid-19 pandemic.

Suggestions for further researchers, in this study only review aspects of learning motivation and self-regulated learning of students where there are many other affective aspects or learning support that can improve students' mathematical communication skills both verbal and in writing. So it is hoped that further research can be carried out by reviewing these specs.

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