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FACTORS THAT AFFECT STUDENTS' MATHEMATICS PERFORMANCE AT HIGHER EDUCATION IN RIAU PROVINCE DURING THE COVID-19 PANDEMIC

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ABSTRACT

This study aims to determine the factors influencing the students' mathematics performance in higher education in Riau Province. The research population was all students in higher education in Riau Province majoring in mathematics. The samples of this research were some students in higher education majoring in mathematics education which were taken randomly with a proportional random sampling approach. The instrument in this research was a questionnaire developed and validated by experts and distributed to mathematics education students. The data analysis used in this research was path analysis. The results showed that there was an effect of learning motivation on mathematics performance, there was no effect of learning interest on mathematics performance, with a T Value of 1.28, (12) there was no effect of self-efficacy on mathematics performance, with T Values of 1.38, there was an effect of self-regulated on mathematics performance, with T Values of 2.23, and (15) there was no effect of learning involvement on mathematics performance, with T Value of 1.39 The dominant and significant factor in influencing the students' mathematics performance in higher education in Riau province during the COVID-19 Pandemic was learning motivation and self-regulation.

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1. INTRODUCTION

Mathematics learning has a function as a means to develop critical, logical, creative, and collaborative thinking skills, where these abilities are indispensable in modern life (Acharya, 2017). Mathematics learning has an important contribution to the development of the abilities of each student to become a quality human resource (Li & Schoenfeld, 2019; Mazana et al., 2019; Risnawati et al., 2019). The need for the development of mathematics learning in students has the aim of building sensitivity to the surrounding environment and being able to solve problems that occur around them.

The number of challenges for students (prospective teachers) in Indonesia related to mathematics is the low achievement of Indonesian students in international forums such as the international mathematics and science olympiads that need to be improved. Referring to the results of The Trends In International Mathematics and Science Study (TIMSS), Indonesia's ranking in 2015 was ranked 44th out of 49 countries with a score of 397. From the Program for International Students Assessment (PISA) in 2018, Indonesia was ranked 75th out of 80 countries. Indonesia received scores from three aspects of the assessment, namely reading at 371 out of an average of 453.1, mathematics at 379 from an average of 458.3, and science at 396 from an average of 457.6.

The low ranking of Indonesian students at the international level is the responsibility of lecturers as a component of the education system in Indonesia. The role of the lecturer is to provide, demonstrate, guide, and motivate students to interact with various learning resources. Lecturers are required not only as presenters or conveyers of knowledge to students but also must be able to help students to develop their skills. A lecturer must be able to create active, innovative, creative, effective, and fun learning so that the learning process generates and attracts student interest and motivation.

Interest in learning is a very important factor in supporting the achievement of the effectiveness of the learning process, which will directly affect learning outcomes. According to Slameto (2015), interest is a sense of interest in a thing or activity without anyone telling. Interest is basically the acceptance of a relationship between oneself and something outside oneself. The stronger or closer the relationship, the greater the interest.

Motivation is one factor that determines the learning process's effectiveness. Motivation is also an internal and external encouragement for someone who is learning with several indicators or supporting elements. These indicators, namely; the desire to succeed, encouragement and needs in learning, hopes and aspirations for the future, appreciation of learning, and a conducive learning environment (Uno, 2021). This is in line with the opinion of Sardiman (2014) that motivation is the overall driving force in students that creates, ensures continuity, and provides direction for learning activities so that it is hoped that the goals can be achieved.

Students must have interest and motivation in every lesson because motivation will make it easier for students to achieve learning goals. Susanto (2012) states that interest is a significant contribution to the success of students. Sardiman (2014) states that a person will succeed in learning if there is a desire to learn. This desire is called motivation. The success of a person's learning is not solely determined by his abilities but also by his interest and learning motivation. It is often found that students who have high abilities but fail in learning are caused by a lack of interest and motivation to learn. Interest and motivation are essentially an effort to produce maximum learning achievement.

Self-regulated learning and self-efficacy can affect student learning success. When a person's independence in learning and self-confidence is high, it is expected that learning achievement is also high. If students have good interest, motivation, Self-regulated learning, and self-efficacy, certainly, the student's performance is also good. In the field of mathematics, involvement, interest, motivation, independence, and self-confidence of students will result in achievement or mathematical performance that can achieve what students expect from learning. However, learning motivation, interest in learning, self-regulation, self-efficacy, and learning involvement of students in university mathematics education study programs in Riau Province is still low. Students do not submit assignments on time, make assignments not optimal, attend lectures lazily, do not want to ask questions when they don't understand, make assignments by cheating friends, and are often late for online lectures. These problems require changes in behavior and interrelated actions.

Therefore, the factors that affect the mathematics performance of students majoring in mathematics education at universities in Riau province need to be investigated.

Slameto (2015) states interest is a persistent tendency to pay attention and remember some activities. Interest in learning is a student's interest in participating in learning without coercion from anyone (Pedro et al., 2018). Interest in learning is a source of high student motivation in participating in learning and improving student achievement (Fryer et al., 2019). High and low student achievement is caused by high interest in learning, so that which increases motivation to succeed in learning (Azmidar et al., 2017). Interest in learning is defined as a tendency towards something because it is profitable. When someone sees that something is profitable, then that person has a sense of interest because it can bring satisfaction (Renninger & Hidi, 2019; Vitasari et al., 2010). Based on the opinions of the experts above, it can be concluded that interest is a sense of interest, attention, and desire that a person has to do something.

Uno (2021) explains that the term motivation comes from the word motive and is defined as a force within a person that causes the individual to act. Santrock (2003) states motivation is why individuals behave, think, and feel, with an emphasis on the activation and direction of behavior. Motivation is encouragement and desire so that a person does an activity by giving the best of himself, both time and energy (Lin & Chen, 2017; Tokan & Imakulata, 2019). Dimyati and Mudjiono (2013) states that motivation is seen as a mental impulse that moves and directs human behavior, including learning behavior. Based on some of the motivation definitions, it can be concluded that motivation is an impulse that a person has to do something.

Nofriyandi (2016) explains that self-regulated is an individual's attitude in facing various situations so that they can think and act on their own to overcome various situations. Schunk and Zimmerman (1998) Stated that self-regulated learning is the ability to monitor understanding, decide when he is ready to be tested, to choose a good information processing strategy. Self-regulation describes students' ability to control themselves to learn actively (Panadero et al., 2017; Wong et al., 2019). Self-regulation is a picture of student's ability to manage themselves to succeed in learning (Carter Jr et al., 2020; Panadero, 2017). There are three main stages of the learning independence cycle: planning one's study, monitoring progress when implementing the plan, and evaluating the results of the completed plan.

Self-efficacy is a person's self-evaluation of his ability or competence to do something or solve an obstacle (Byrne & Baron, 1977; Hatlevik et al., 2018). According to Joët et al. (2011) and Schunk and DiBenedetto (2020), self-efficacy is basically the result of a cognitive process in the form of a decision, belief, or expectation about the extent to which the individual estimates his or her ability to complete a task. Self-efficacy will affect several aspects of one's cognition and behavior. Self-efficacy can affect student performance in college because students' confidence in their ability to learn will increase their efforts to succeed (Joët et al., 2011). Students who have high self-efficacy will try hard to learn because the goal of learning is learning achievement (Bartimote-Aufflick et al., 2016; van Dinther et al., 2011). Self-efficacy can strengthen students in achieving their academic achievements (Yeşilyurt et al., 2016). Therefore, increasing student confidence in learning needs to be done so that student learning achievement in higher education also increases.

Learning involvement is a student's effort with various strategies, facilities, and all sources that can support success in learning (Staley et al., 2017; Zuber-Skerritt, 2002). Involvement in learning mathematics describes a student's efforts to achieve success in the learning process (Takeuchi, 2018). Learning engagement is a way for students to create tools that involve complex ways to succeed in learning (Turner et al., 1998). Parental involvement is part of the way students are involved in learning with parental motivation or support (Panaoura, 2021). Parental motivation can improve students' efforts in learning so that

students use time effectively to engage in learning (Gómez-García et al., 2020). Involvement is a definition in which a student is actively involved in learning to get maximum learning outcomes.

Student performance describes student achievement in the teaching and learning process in the classroom (Yeşilyurt et al., 2016). Student performance or achievement is the impact of learning activities that have been carried out by teachers and students (Chukwuyenum, 2013; Maliki et al., 2009). Performance describes the results of interactions between educators and students in the form of numbers measured through tests or learning outcomes instruments (Gómez-García et al., 2020; Imms & Byers, 2017). Student performance explains the extent to which students have worked optimally in the learning process so that students get maximum learning outcomes. Student performance in learning is described by learning outcomes both cognitively, affectively, and psychomotor (Awofala, 2017). Student performance is the impact of learning that can be measured through test instruments or non-test instruments.

This research objective was to find the variables that affected the student's performance during the COVID-19 Pandemic. The pandemic made education activities in the classroom unable to run maximally (Darras et al., 2021). Online learning becomes the best strategy and does not contribute to transferring knowledge because of less interaction between students and teachers (Alzahrani, 2022). Learning activities do not significantly contribute to education development because students are less interested and motivated to follow the class activities (Singh et al., 2021). The students can not control and manage time to solve homework and are always late in collecting them (Mesghina et al., 2021). Students are not involved maximally in learning because the students have difficulties finding the learning source and only rely on the internet (Diaz et al., 2021). From the above problem, the six variables were considered to solve the problem so that the affected variables can be given the best strategy to improve learning activities in higher education.

2. METHOD

The design of this research is quantitative with a correlational approach. The research population was students in higher education majoring in mathematics education which consisted of Riau Islamic University (UIR), Sultan Syarif Qasim State Islamic University (UIN), Pasir Pengarayan University (UPP), Tambusai University, and Riau University (UR) with total students of 1238. The samples of this research were some students in higher education majoring in mathematics education which were taken randomly with a proportional random sampling approach. The calculation of the sample number uses the Slovin formula with 303 samples. The instrument in this research was a questionnaire. The six variables in this research were the students' interest (feeling happy, student interest, attention students), motivation (Persevere in the face of the task, Tenacious in the face of adversity, interest in various issues, prefer to work independently, and can defend his opinion), student self-regulated (Study initiative, diagnose learning needs, set learning goals, planning and controlling learning, happy challenge, the wise use of time and learning resources), student self-efficacy (Magnitude, Strength, Generality), student involvement (Agentic engagement, Behavioral engagement, Emotional engagement), and student mathematics performance in college (quantity, quality, effectiveness, independence). The instrument validation has been done in two-way content and construct. In content, the instrument is validated by three experts in measurement, evaluation, and education development. The content validation result showed that seven items are needed to improve. In construct, validation is done by spreading the instrument to 120 mathematics students and analyzed with CFA (Confirmatory Factor Analysis). The construct validity result showed

that the 25 indicators of six variables were valid with a loading factor greater than 0.3. Data analysis in this study used path analysis. Path analysis will show the effect of exogenous to endogenous variables and endogenous to other endogenous variables. Path analysis shows a complete analysis of the results of each variable that had an influence.

3. RESULT AND DISCUSSION

3.1. Result

Path analysis was conducted to see the effect of the independent variable on the moderating variable and the moderating variable on the dependent variable. Before the path analysis is carried out, checking the normality of the data and multicollinearity is also necessary. The assumption of normality can be seen in Table 1.

Table 1. Data normality from skewness and kurtosis

Variables	Zskewness	Decision	Zkurtosis	Decision	Conclusion
Self-Regulation	2.665094	Moderate	0.739373	Normal	Normal
Self-Efficacy	-0.13274	Normal	1.303854	Normal	normal
Motivation	1.936273	Normal	1.502399	Normal	normal
Interest	0.524394	Normal	1.788018	Normal	normal
Involvement	1.760995	normal	-1.32269	Normal	Normal
Performance	2.414667	Moderate	4.070203	Normal	Normal

Table 1 shows that variables self-regulation, self-efficacy, motivation, interest, involvement, and performance were normally distributed. This assumption explained that six variables could be analyzed using regression, path analysis, or structural equation modeling. The next assumption that will be checked is multicollinearity (see Table 2).

Table 2. Multicolinieritas from Product Moment Correlation

Variables	Self-Reg	Self-Eff	Mot	Interest	Involve	Performance
Self-Reg	1	.183*	.612**	.659**	.609**	.547**
Self-Eff	.183*	1	.401**	.355**	.300**	.324**
Mot	.612**	.401**	1	.696**	.536**	.580**
Interest	.659**	.355**	.696**	1	.719**	.578**
Involve	.609**	.300**	.536**	.719**	1	.520**
Performance	.547**	.324**	.580**	.578**	.520**	1

Table 2 shows the acquired correlation coefficient of self-regulation on self-efficacy, learning motivation, learning interest, learning involvement, and students' performance: 0.183, 0.612, 0.659, 0.609, and 0.547. The correlation coefficient of self-efficacy with learning motivation, learning interest, learning involvement, and students' performance, respectively, was 0.401, 0.355, 0.300, and 0.324. The coefficient correlation of learning motivation, learning interest, learning involvement, and students' performance, respectively, was 0.696, 0.536, and 0.580. The correlation coefficient of learning interest on learning involvement and students' performance was 0.719 and 0.578. The correlation coefficient of learning involvement on students' performance was 0.520. From correlation analysis, it can be concluded that the highest coefficient was 0.719 (correlation between learning interest on learning involvement) with a high category. The highest correlation from the analysis showed that all variables did not have the perfect coefficient correlation, so the multicollinearity assumption was met.

Path analysis showed the effect of exogenous variables on endogenous variables, the endogenous variables to other endogenous variables. The path analysis result can be seen in Figures 1 and 2 and Table 3.

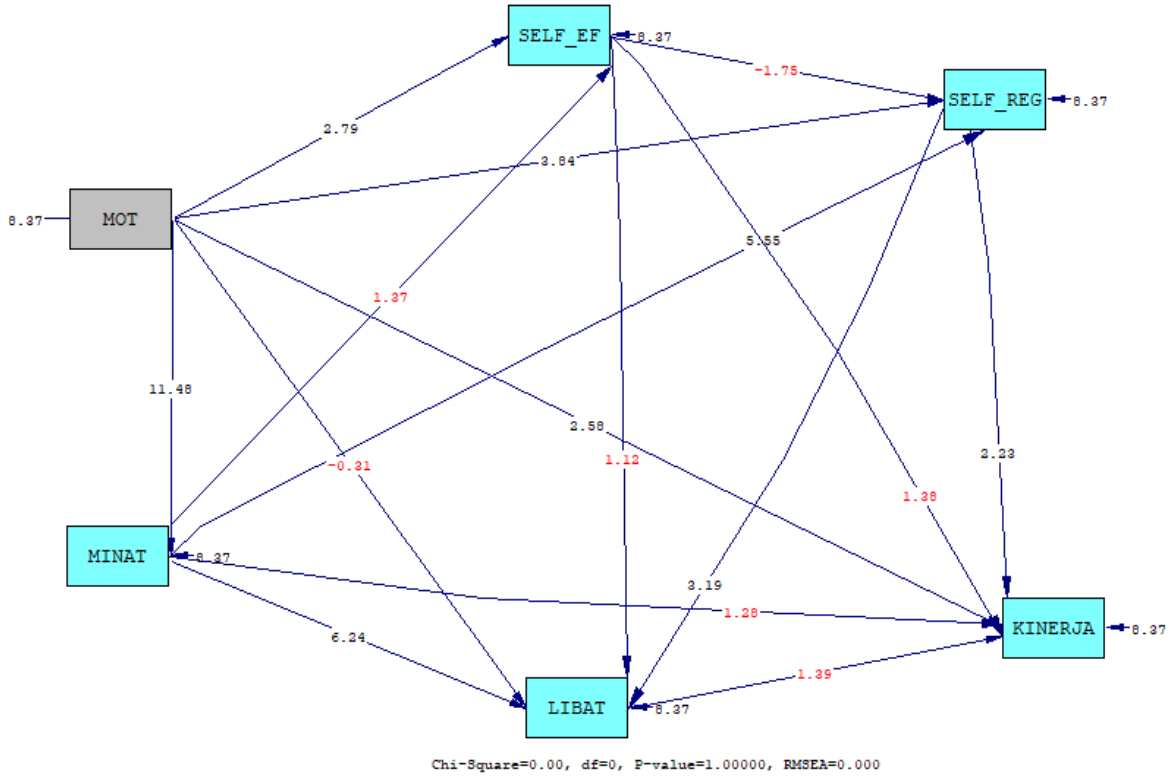

Figure 1. Path analysis with standardized

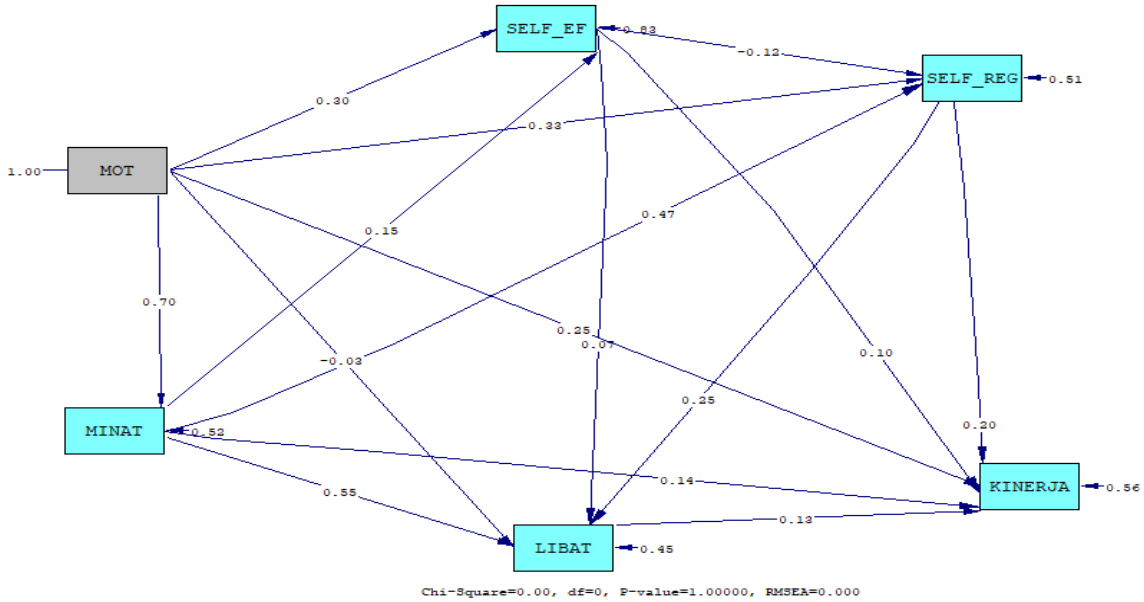

Figure 2. Path analysis with t-value

Table 3 shows that some of the results of the path analysis were (1) there was an effect of learning motivation on learning interest, with a T-Value of 11.49, (2) there was no effect of learning motivation on learning involvement with T values of -0.31, (3) there was an effect of learning motivation on students' self-regulated, with a T-Value of 3.64, (4) there was an effect of learning motivation on students' self-efficacy, with T-Value of 2.79, (5) there was an effect of learning motivation on mathematics performance, with T-Value of 2.59, (6) there was an effect of learning interest on self-regulated students, with a T-Value of 5.55, (7) there was no effect of learning interest on students' self-efficacy, with T-Value of 1.37, (8) there was an effect of learning interest on learning involvement, with T-Value of 6.26, (9) there was no effect of learning interest on mathematics performance, with T-Value of 1.28, (10) there was no effect of students' self-efficacy on self-regulated, with T Values of -1.75, (11) there was no effect of self-efficacy on learning involvement, with T Values of 1.12, (12) there was no effect of self -efficacy on mathematics performance, with T Values of 1.38, (13) there was an effect of self-regulated on learning envolvement, with T Values of 3.19, (14) there was an effect of self-regulated on mathematics performance, with T Values of 2.23, and (15) there was no effect of learning involvement on mathematics performance, with T Value of 1.39.

Table 3. Summary of path analysis

Variables	T-values	R	Conclusion
Motivation*Interest	11.49	0.70	Significant
Motivation*Involvement	-0.31	-0.03	No Significant
Motivation*Self-Regulated	3.64	0.33	Significant
Motivation*Self Efficacy	2.79	0.30	Significant
Motivation* Performance	2.59	0.25	Significant
Interest*Self-Regulated	5.55	0.47	Significant
Interest*Self Efficacy	1.37	0.15	No Significant
Interest*Involvement	6.26	0.55	Significant

Variables	T-values	R	Conclusion
Interest*Performance	1.28	0.14	No Significant
Self-Efficacy*Self-Regulated	-1.75	-0.12	No Significant
Self-Efficacy*Involvement	1.12	0.07	No Significant
Self-Efficacy*Performance	1.38	0.10	No Significant
Self-Regulated*Involvement	3.19	0.25	Significant
Self-Regulated*Performance	2.23	0.20	Significant
Involvement*Performance	1.39	0.13	No Significant

3.2. Discussion

The analysis results show that motivation and self-regulation directly affected students' performance in the COVID-19 Pandemic. This result explains that motivation and self-regulated the best variables need to improve students' performance in the COVID-19 Pandemic. Motivation always is needed to improve and generate the best outcome for the education process in the classroom (O'Shea et al., 2017; Orehek et al., 2017). Self-regulation and motivation are highly correlated in improving students' performance because these variables will solve every problem in the classroom learning activities (Wilby, 2022). High motivation affects self-regulation, and self-regulation maximally will increase the students' performance (Köpetz et al., 2013). Motivation and self-regulation become the best concept to improve the learning quality, so the interaction between teachers and students become meaningful (Faílde-Garrido et al., 2022). Motivation and self-regulation will be the best variables to support the learning process in the classroom so the learning process will run maximally and contribute to the education progress.

The results of the analysis show a direct influence between the motivation on the learning interests and mathematics performance. The motivation of students gives a good contribution to the learning interest and mathematics performance of students. Bye et al. (2007) said that motivation and interest had a positive effect on university students. Lavasani et al. (2011) explained that academic motivation is a motivation that initiates and guides students to have an interest in learning. In addition to student learning interest, motivation also directly affected student self-regulation. Academic motivation had a significant positive relationship with learning independence (Self-Regulated) (Akbay & Akbay, 2016; Mahmoodi et al., 2014). The analysis results also show that there was a significant effect between student motivation and student self-efficacy. Köseoglu (2015) explained that self-efficacy believes in the abilities and strengths possessed in working, studying, and seeking success in obtaining academic achievement. Good motivation possessed by students will be able to obtain good academic results, too, because students who have motivation can act according to their abilities or competencies to carry out tasks and achieve and resolve obstacles to achieve goals.

Student motivation didn't affect learning involvement in learning. This happens because students feel more directly involved when learning in class than just being charged with individual tasks. Students can discuss with friends or with lecturers during class learning compared to just doing assignments. Interest in learning has a significant effect on self-regulated and learning involved in learning. Students with a good interest in learning can influence their self-regulation and involvement in learning because the interest that grows in students is a source of encouragement to do something they want (Bernacki & Walkington, 2018; Tsai et al., 2018). The learning that students wanted was direct learning in class, not just giving individual assignments. Learning that is carried out directly makes

students feel involved in learning, producing positive results and independence for students. Velayutham et al. (2011) states that students' confidence in their inner self and self-regulated can be used as an instrument to influence student involvement in the learning process.

Student interest did not affect self-efficacy and student mathematics performance. This happens because many students have a sense of love or interest in learning mathematics but are not sure about their abilities, so low student confidence has an impact on students' mathematics performance. Based on the analysis results, it can be seen that student self-efficacy did not affect self-regulation, learning engagement, or student mathematics performance. This result occurs because students did not consistently maintain motivation and enthusiasm for learning. Students who have the motivation to learn will maintain self-efficacy and improve self-regulated strategies in their lives. Cobb (2003) said that self-regulated learning is influenced by many factors, including self-efficacy, motivation, and goals. According to Alafgani and Purwandari (2019), self-efficacy, motivation, and learning goals possessed by students are positively related to self-regulated learning. Self-efficacy that consistently exists in students can have a positive effect on self-regulation (Bradley et al., 2017).

Schunk and Zimmerman (1998) states that self-regulated was the concept of how a student becomes a regulator for his learning. There was a significant effect of self-regulated on student involvement and mathematics performance. This shows that mathematics education students in Riau province can manage themselves in learning, be active during the learning process, and can regulate their learning performance. Self-regulation can significantly affect student involvement in learning so that they achieve achievement in learning (Uzun & Kilis, 2019). Students' Self-regulated causes students to be persistent in achieving learning goals so that the effectiveness of the learning process can run optimally (Yerdelen & Sungur, 2019).

Student involvement in learning did not affect students' mathematics performance. There was no effect of student involvement on student performance due to the lack of parental involvement in motivating students to learn (Shute et al., 2011; Yawman et al., 2019). Another factor that caused students' involvement did not affect mathematics performance was the low involvement of students in learning. The low involvement of students because learning during the Pandemic focuses on online learning, potentially increasing or decreasing students' mathematics performance. The low involvement of students in learning is due to the lack of student participation in learning activities which indirectly affects student performance (Maolida & Savitri, 2016).

4. CONCLUSION

Variables that affected students' mathematical performance were motivation and self-regulated. Students' Self-regulated affected learning involvement and mathematics performance. The motivation variable did not affect the learning engagement variable, but it affected learning interest, self-regulated self-efficacy, and mathematics performance of Mathematics education students of the Riau Province University. The learning interest variable affected students' mathematical performance and self-efficacy but did not affect self-regulation and learning engagement. The Self-Efficacy variable did not affect the Self-Regulated variable, learning engagement, and student mathematics performance. Motivation and self-regulated were significant variables that affected students' mathematics performance in higher education in Riau Province during the COVID-19 Pandemic.

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