



How Self-regulated Learning and Motivation Affect Mathematics Outcomes of Students Living in Boarding Schools and at Home

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ABSTRACT

This study aims to analyze the effects of self-regulated learning and learning motivation on mathematics learning outcomes among students residing in boarding schools and at home. The study used a quantitative approach with a survey method. The sample consisted of 90 students of Madrasah Aliyah in Yogyakarta, which was taken using a purposive sampling technique, with 45 students living in boarding schools and 45 students living at home. The research instruments included questionnaires to measure self-regulated learning and learning motivation, as well as midterm assessment test results to evaluate mathematics learning outcomes. The data were analyzed using multiple linear regression. The results showed that self-regulated learning and learning motivation had an influence of 7.9% on the learning outcomes of students living in boarding schools and 8.5% on students living at home. Learners at home exhibited a stronger positive relationship between learning motivation and learning outcomes compared to learners in boarding schools. Learning motivation, especially intrinsic ones, is an important factor in supporting learners' learning outcomes at home, while the structured environment in boarding schools tends to make other factors, such as teaching methods and facilities, more dominant.

Keywords: *learning outcomes, learning motivation, boarding school, self-regulated learning*

ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh *self-regulated learning* dan motivasi belajar terhadap hasil belajar matematika pada siswa yang tinggal di asrama dan di rumah. Penelitian ini menggunakan pendekatan kuantitatif dengan metode survei. Sampel terdiri dari 90 siswa Madrasah Aliyah di Yogyakarta, yang diambil dengan menggunakan teknik *purposive sampling*, dengan 45 siswa yang tinggal di asrama dan 45 siswa yang tinggal di rumah. Instrumen penelitian adalah kuesioner untuk mengukur *self-regulated learning* dan motivasi belajar, dan hasil tes penilaian tengah semester untuk mengukur hasil belajar matematika. Data dianalisis dengan menggunakan regresi linier berganda. Hasil penelitian menunjukkan bahwa *self-regulated learning* dan motivasi belajar memiliki pengaruh sebesar 7,9% terhadap hasil belajar siswa yang tinggal di asrama dan 8,5% pada siswa yang tinggal di rumah. Pembelajar di rumah menunjukkan hubungan yang lebih positif antara motivasi belajar dan hasil belajar daripada pembelajar di asrama. Motivasi belajar, terutama yang intrinsik, merupakan faktor penting dalam mendukung hasil belajar peserta didik di rumah, sementara lingkungan terstruktur di sekolah asrama cenderung membuat faktor lain, seperti metode dan fasilitas pengajaran, lebih dominan.

Kata Kunci: *capaian pembelajaran, motivasi belajar, asrama, pembelajaran mandiri*

INTRODUCTION

Education is a planned and conscious effort to provide help and guidance in developing the physical and spiritual potential given to students through adults to achieve the maturity of students and achieve the goal of being able to carry out their duties independently (Aini et al., 2021). Education is a long-term investment that requires effort and money, but is a basic human need. Education is a process that contains a wide variety of activities that are suitable for individuals for their social life and help pass on customs and culture and social institutions from generation to generation (Muhtarom, 2018). The education system approach states that education is an effort to form a whole consisting of several components that are functionally interconnected to achieve educational goals (transforming inputs into outputs) (Pristiwanti et al., 2022). A person's knowledge, attitudes and abilities will deteriorate without education. Information, attitudes and abilities are indispensable for the survival of individuals and society in the future.

In the current era of information and technology, the learner-centered learning paradigm, also known as learner-centered learning, is considered better than the educator-centered learning paradigm (Prihatmojo et al., 2019). Educational technology can be defined as the systematic handling or implementation of education (Lailan, 2024). In addition, educational technology can be considered as a complex and integrated process that includes all aspects of human learning, including people, procedures, concepts, equipment, and organizations to analyze problems, find solutions to these problems, implement, assess, and manage these problem solving. Thus, it can be concluded that educational technology is not only a field of science but also a source of information and learning that suits educational needs and has the ability to facilitate learning (Anshori & Setiabudi, 2023).

In today's world of education, mathematics has become a compulsory subject because mathematics is very important for everyday life and the future of students. Mathematics is a systematic field of science that examines language, art, relationships, and patterns of thinking. Psychologically, math skills can help individuals to think logically in mathematics or other sciences (Indrawati et al., 2019). Therefore, efforts are needed to improve student learning outcomes and obtain better quality education to achieve optimal learning outcomes. Student learning outcomes are defined as the level of ability that students have after experiencing learning experiences, according to (Sari, 2019). Efforts made by students where they can find out the extent to which they have succeeded in following the learning process. Math learning outcomes are one example of these learning outcomes.

Learning outcomes are the results of the learning process using measurement tools, namely tests that are prepared in a planned manner, both written and written tests, which include cognitive, affective, and psychomotor aspects. These results can be measured through the use of symbols, numbers, letters, and sentences (Ernawati, 2024). Here are two types of factors that affect learning outcomes, internal factors and external factors. Internal factors include physical, psychological, and fatigue and external factors include family, school, and community (Damayanti, 2022).

Boarding school is one form of environment that can affect student learning outcomes. According to the Department of Islamic Religious Affairs of the Republic of Indonesia, boarding schools are religious educational institutions that have their own characteristics and are different from other educational institutions. Students in boarding schools usually undergo a curriculum that includes religious subjects such as Al-Qur'an, Hadith, Fiqh, as well as general subjects such as Mathematics, Physics, and Indonesian. This is in line with the view that education is a planned effort to develop the physical and spiritual potential of students (Mukhlis, 2023). In addition, education in Islamic boarding schools also emphasizes character and moral building, which is considered important in forming a generation that is not only academically intelligent but also has good morals (Muhtarom, 2018).

Furthermore, learning outcomes can be influenced by affective aspects, namely learning independence and student motivation. Learners are an important part of learning because they are given full responsibility from the start, giving them greater learning independence (Tarumasely, 2021). Terminologically, learning independence or self-regulated learning is a learning activity that is largely managed by the learners themselves, such as making preparations and making observations while working on tasks regularly. This shows that the ability to manage learning activities is important for every learner. Self-regulated learning is an effort to improve students' cognitive, motivation, and behavior in order to be more proactive in the learning process in the classroom. According to Santrock (Lesmanawati et al., 2020), self-regulated learning is self-generation and self-monitoring of thoughts, feelings, and behavior to achieve goals.

Learning independence places importance on one's ability to organize and control oneself, especially when facing a task. Learning independence is an activity of students to increase their capacity in the learning process, the desire to change the reality of mathematics learning into something fun, and efforts to manage students' time and learning environment. So it can be concluded that learning independence is the ability to monitor, regulate, control aspects of cognition, motivation and behavior of students themselves in learning. Learners are also confident in their ability to solve problems without the help of others (Fitriani & Pujiastuti, 2021). Learning independence does not mean learning alone, but learning on your own initiative, either with or without the help of others (Berek et al., 2023). According to research conducted by (Abror et al., 2023), self-regulated learning or learning independence plays an important role in improving student learning outcomes, including in mathematics learning. Learning independence allows students to not only depend on teacher instructions but also actively seek additional learning resources and apply more effective learning strategies. Based on the various definitions of experts above, it can be concluded that self-regulated learning is the ability of students to organize their learning process to achieve predetermined goals. The goal is to become a self-regulated human being (Arifin & Tihin, 2019).

In addition to learning independence, learning motivation is one of the factors that has the potential to play a role in students' mathematics learning process. Learning motivation is all forms

of direction in students during the learning process to get certain desires, goals, or goals that have been determined (Rahman, 2024). Learning motivation is a psychological drive that encourages individuals to engage in the learning process and achieve academic goals. It encompasses the desire and passion instilled in students to learn, which can be influenced by various factors such as need, determination and learning style. Students with high learning motivation tend to be more active and enthusiastic in learning activities, while low motivation can lead to inactivity and boredom. In the context of education, learning motivation is very important because it can affect learning outcomes and student academic success (Putri & Dewanti, 2023). With motivation, it is able to encourage a person to find and select actions that must be done in order to achieve goals (Rahman, 2024). If students have learning motivation, then students are eager to find ideas or ideas when facing a problem (Anditiasari et al., 2021).

Learning motivation consists of two types, namely intrinsic motivation and extrinsic motivation (Zamsir et al., 2015). Intrinsic motivation is motivation that comes from students, while extrinsic motivation is motivation that comes from outside students. Students are said to have learning motivation if they meet the following indicators, 1) there is a desire and desire to succeed, 2) there are encouragement and needs in learning, 3) there are hopes or future goals, 4) there are rewards in learning, 5) there are interesting activities in learning, 6) there is a conducive learning environment (Uno, 2013). With the existence of learning motivation indicators in students, it will cause learning activities to occur, ensure the occurrence of learning activities, and provide direction to learning activities to obtain the intended results (Fernando et al., 2024).

In this modern era, a learner-centered learning approach is getting more attention. This paradigm prioritizes the active role of learners in the teaching and learning process, so that they can be more independent and responsible for their own learning (Prihatmojo et al., 2019). Learning independence or self-regulated learning and learning motivation include the main focus in education in Islamic boarding schools, where students are taught to organize their own learning process in order to achieve predetermined goals (Tarumasely, 2021).

Several previous studies have examined the effect of self-regulated learning and learning motivation on math learning outcomes. However, there are still few studies that specifically compare how these factors work in two different learning environments, namely in boarding schools and at home. Therefore, this study aims to analyze the influence of self-regulated learning and learning motivation on mathematics learning outcomes by comparing students who live in boarding schools and students who live at home. Mathematics was chosen as the research subject because it is often considered a challenging subject and requires high cognitive skills.

METHODS

This research uses a quantitative approach, which is a research method based on the philosophy of positivism, used to research on certain populations or samples, sampling techniques

are generally carried out randomly, data analysis is quantitative / statistical with the aim of testing the hypothesis that has been set by (Irvan et al., 2023). Where this research was studied using numbers with a survey method, the survey was conducted while carrying out the Introduction to Educational Field (PLP). The population in this study were students of one of the Madrasah Aliyah in Yogyakarta grades X, XI, and XII, both living at home and in boarding schools. The research sample was taken using purposive sampling technique, with a total of 90 students consisting of 45 students living at home and 45 students living in boarding schools.

The instruments used in this study were questionnaires and student assessment tests. Questionnaires are used to measure self-regulated learning and learning motivation of students who have been validated and assessment tests to measure student learning outcomes in the form of midterm assessment test questions from schools. This study uses a questionnaire consisting of a self-regulated learning questionnaire and a learning motivation questionnaire. To measure self-regulated learning there are 3 aspects according to (Zimmerman, 2000), namely 1) Metacognition; 2) Motivation; 3) Self reflection/behavior. Where the Metacognition aspect has 4 indicators, the Motivation aspect has 3 indicators, and the Behavior aspect has 2 measurement indicators. To measure learning motivation, there are 6 indicators according to (Uno, 2013) namely 1) Desire and desire to succeed, 2) Encouragement and needs in learning, 3) Expectations and future goals, 4) Appreciation in learning, 5) Interesting activities in learning, 6) Conducive learning environment.

The questionnaire used is a closed direct questionnaire where respondents only need to choose one answer that suits their condition because alternative answers have been provided in the questionnaire. The data obtained from this study are in the form of Google Form results data, which are then compiled by researchers and analyzed using multiple regression analysis techniques to determine the effect of self-regulated learning and learning motivation on students' mathematics learning outcomes.

In this study, researchers used quantitative data analysis methods by using multiple linear regression analysis methods. Multiple linear regression is a regression model that involves more than one independent variable. Multiple linear regression analysis is performed to determine the direction and how much influence the independent variable has on the dependent variable (Nurani et al., 2023). In this study, researchers used this method to predict the relationship between two variables (Self Regulated and Learning Motivation). The analysis was carried out by processing data through the Excell and SPSS programs. The data analysis methods that will be used are descriptive statistical tests, classical assumption tests (Normality Test, Linearity Test, Heteroscedasticity Test, Multicollinearity Test), multiple linear regression models and hypothesis testing.

ANOVA Table			Sum of Squares	df	Mean Square	F	Sig.
Hasil Belajar *	Between Groups	(Combined)	539.296	13	41.484	.959	.511
Motivasi Belajar		Linearity	84.275	1	84.275	1.948	.173
		Deviation from Linearity	455.021	12	37.918	.877	.578
	Within Groups		1254.378	29	43.254		
	Total		1793.674	42			

Figure 3. Output Linearity Test Learning Motivation

Based on the output shown in Figure 2 and Figure 3, the Significance (Sig) value is $0.996 > 0.05$ for self-regulated learning and $0.578 > 0.05$ for learning motivation. Thus the self-regulated learning variable (X1) and learning outcomes (Y) have a significant linear relationship. Likewise, the learning motivation variable (X2) and learning outcomes (Y) have a significant linear relationship.

b. Learners at home

ANOVA Table			Sum of Squares	df	Mean Square	F	Sig.
Hasil Belajar * Self Regulated Learning	Between Groups	(Combined)	678.238	10	67.824	1.880	.085
		Linearity	.058	1	.058	.002	.968
		Deviation from Linearity	678.181	9	75.353	2.089	.060
	Within Groups		1190.557	33	36.077		
	Total		1868.795	43			

Figure 4. Output Linearity Test Self-regulated Learning

ANOVA Table			Sum of Squares	df	Mean Square	F	Sig.
Hasil Belajar *	Between Groups	(Combined)	363.864	9	40.429	.913	.525
Motivasi Belajar		Linearity	60.596	1	60.596	1.369	.250
		Deviation from Linearity	303.268	8	37.908	.856	.561
	Within Groups		1504.932	34	44.263		
	Total		1868.795	43			

Figure 5. Output Linearity Test Learning Motivation

Based on the output shown in Figure 4 and Figure 5, the Significance (Sig.) value is $0.060 > 0.05$ for self-regulated learning and $0.561 > 0.05$ for learning motivation. Thus the variables of self-regulated learning (X1) and learning outcomes (Y) have a significant linear relationship. Likewise, the learning motivation variable (X2) and learning outcomes (Y) have a significant linear relationship.

3. Heteroskedasticity Test

The heteroscedasticity test is an important assumption in regression analysis because it aims to ensure that the resulting regression model has a constant error variance. If heteroscedasticity occurs, the resulting regression model is unreliable.

a. Learners at boarding schools

Coefficients ^a					
		Unstandardized Coefficients		Standardized Coefficients	
Model		B	Std. Error	Beta	t
1	(Constant)	11.422	5.203		2.195
	Self Regulated Learning	-.086	.148	-.143	-.582
	Motivasi Belajar	-.063	.200	-.077	-.313

a. Dependent Variable: Abs RES

Figure 6. Output Heteroscedasticity Test

Based on the output in Figure 6, it is known from the data self-regulated learning = 0.564 and learning motivation = 0.756 which means more than 0.05, so the data does not occur heteroscedasticity.

b. Learners at home

Coefficients ^a					
		Unstandardized Coefficients		Standardized Coefficients	
Model		B	Std. Error	Beta	t
1	(Constant)	36.638	18.571		1.973
	Self Regulated Learning	.771	.443	.301	1.741
	Motivasi Belajar	-.728	.438	-.286	-1.659

a. Dependent Variable: Abs RES

Figure 7. Output Heteroscedasticity Test

Based on the output in Figure 7, it is known from the data self-regulated learning = 0.089 and learning motivation = 0.105 which means more than 0.05, so the data does not occur heteroscedasticity.

4. Multicollinearity Test

Multicollinearity test is the final step in multivariate testing conducted before carrying out SEM analysis. This test aims to determine whether there is a relationship or correlation between the independent variables (X variables) (Adam, 2018).

a. Learners at boarding schools

Coefficients ^a							
		Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	
1	(Constant)	52.355	9.751		5.369	.000	
	Self Regulated Learning	-.276	.278	-.239	-.991	.328	.399
	Motivasi Belajar	-.049	.375	-.031	-.130	.897	.399

a. Dependent Variable: Hasil Belajar

Figure 8. Output Multicollinearity Test

Calculation guidelines:

If the VIF value < 10.00 then there is no multicollinearity

If the VIF value > 10.00 then multicollinearity occurs

Based on the output and calculation guidelines in Figure 8, the data obtained is less than 10.00, so the data does not occur multicollinearity.

b. Learners at home

Coefficients ^a							
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics
		B	Std. Error	Beta			
1	(Constant)	14.360	18.969		.757	.453	
	Self Regulated Learning	-.383	.380	-.204	-1.006	.320	.558
	Motivasi Belajar	1.023	.658	.316	1.555	.128	.558

a. Dependent Variable: Hasil

Figure 9. Output Multicollinearity Test

Calculation guidelines:

If the VIF value < 10.00 then there is no multicollinearity

If the VIF value > 10.00 then multicollinearity occurs

Based on the output and calculation guidelines in [Figure 9](#), the data obtained is less than 10.00, so the data does not occur multicollinearity.

5. Hypothesis Testing

Linear regression data analysis technique was used for hypothesis testing. The hypothesis of this study is “There are differences in self-regulated learning, learning motivation, and learning outcomes of students who live in boarding schools and at home”. The results of hypothesis testing are shown in [Figure 10](#).

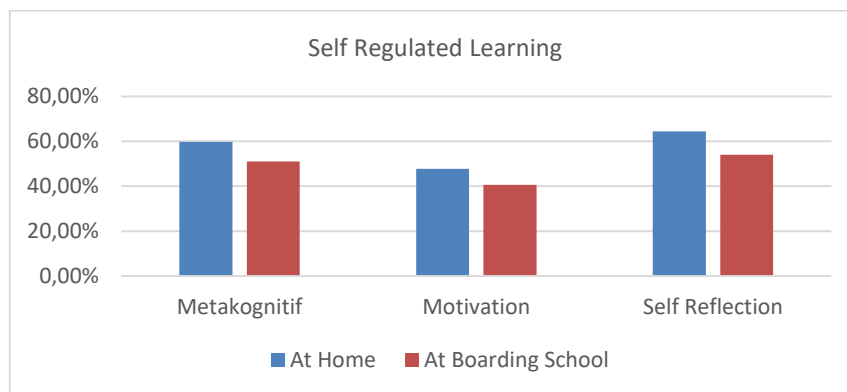


Figure 10. Distribution of Students' Self-regulated Learning

This diagram shows that the self-regulated learning behavior indicator has the highest percentage compared to metacognition and motivation, both for learners in the boarding schools and at home. This indicates that learners, especially those living at home, tend to be more active in controlling and managing their learning behavior than the metacognition or motivation aspects. However, the difference in percentages between the two groups indicates that the learning environment also plays a role in shaping students' learning independence patterns.

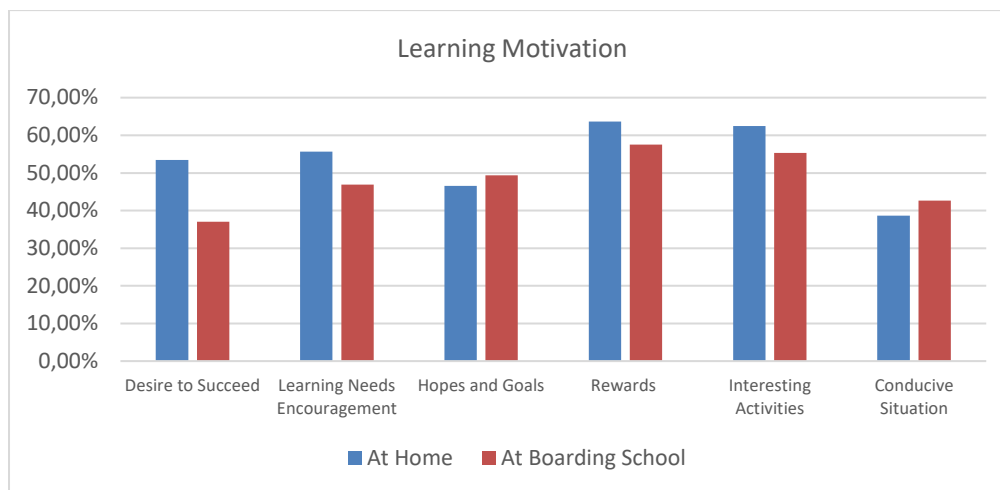


Figure 11. Distribution of Students' Learning Motivation

Based on Figure 11, it is found that the reward indicator has the highest percentage in learning motivation, while the desire to succeed indicator has the lowest percentage, especially for students in boarding schools. This shows that appreciation or recognition from the learning environment is a more dominant factor in shaping students' motivation. In contrast, the low percentage of desire to succeed in boarding schools may indicate that external factors, such as a more structured education system, may be more influential than students' own intrinsic drive.

The relationship between self-regulated learning and learning motivation on learning outcomes for students who live in a boarding school

The value (R) obtained is 0.280 as shown in Figure 12. It is concluded from the value (R Square) that the output obtained is 0.079, which means that self-regulated learning and student learning motivation have an influence of 7.9% on learning outcomes.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.280 ^a	.079	.032	6.372

a. Predictors: (Constant), Motivasi Belajar diPondok, Self Regulated Learning diPondok

Figure 12. Output Regression Model

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	138.419	2	69.209	1.704	.195
	Residual	1624.325	40	40.608		
	Total	1762.744	42			

a. Dependent Variable: Hasil Belajar

b. Predictors: (Constant), Motivasi Belajar diPondok, Self Regulated Learning diPondok

Figure 13. Output Regression Model

Based on Figure 13, the Sig value is obtained. $0,195 > 0,05$. It is concluded from the output obtained that self-regulated learning (X1) and learning motivation (X2) on learning outcomes (Y).

Coefficients ^a							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	53.557	9.621	5.566	.000	34.112	73.003
	Self Regulated Learning diPondok	-.278	.275	-.243	-1.013	.317	-.833
	Motivasi Belajar diPondok	-.070	.370	-.046	-.190	.851	-.818

a. Dependent Variable: Hasil Belajar

Figure 14. Output Regression Model

Based on Figure 14, the resulting regression equation between self-regulated learning and learning motivation on learning outcomes is $Y = 53.557 - 0.278 X_1 - 0.070 X_2$.

The relationship between self-regulated learning and learning motivation on learning outcomes of students who live at home

The value (R) obtained is 0.292 as shown in Figure 15. It is concluded from the value (R Square) that the output obtained is 0.085, which means that self-regulated learning and student learning motivation have an influence of 8.5% on learning outcomes

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.292 ^a	.085	.040	6.458

a. Predictors: (Constant), Motivasi Belajar diRumah, Self Regulated Learning diRumah

Figure 15. Output Regression Model

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	158.929	2	79.465	1.905	.162 ^b
	Residual	1709.866	41	41.704		
	Total	1868.795	43			

a. Dependent Variable: Hasil Belajar

b. Predictors: (Constant), Motivasi Belajar diRumah, Self Regulated Learning diRumah

Figure 16. Output Regression Model

Based on Figure 16, the Sig value is obtained. $0,162 > 0,05$. It is concluded from the output obtained that self-regulated learning (X_1) and learning motivation (X_2) on learning outcomes (Y).

Coefficients ^a								
		Unstandardized Coefficients		Standardized Coefficients		95,0% Confidence Interval for B		
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	23.787	12.882		1.846	.072	-2.229	49.803
	Self Regulated Learning diRumah	-.417	.338	-.236	-1.231	.225	-1.100	.267
	Motivasi Belajar diRumah	.811	.415	.374	1.952	.058	-.028	1.650

a. Dependent Variable: Hasil Belajar

Figure 17. Output Regression Model

Based on [Figure 17](#), the resulting regression equation between self-regulated learning and learning motivation on learning outcomes is $Y = 23.787 - 0.417 X_1 + 0.811 X_2$.

The results showed that self-regulated learning and learning motivation have different influences on math learning outcomes for students who live in boarding schools and at home. In students who live in boarding schools, self-regulated learning ($\beta = -0.243$, $p = 0.317$) and learning motivation ($\beta = -0.046$, $p = 0.851$) do not show significant influence on learning outcomes. In addition, for students who live at home, the results of multiple linear regression analysis show that self-regulated learning has a negative but insignificant influence on learning outcomes ($\beta = -0.236$, $p = 0.225$), while learning motivation has a positive influence that is close to significant ($\beta = 0.374$, $p = 0.058$). This shows that learning motivation plays a greater role than self-regulated learning in influencing student learning outcomes at home.

This difference can be caused by the different context of the learning environment. Students at home tend to have more flexibility in managing their study time, so intrinsic learning motivation becomes an important factor in supporting their achievement. On the other hand, students in boarding schools face a more structured learning environment, so the possibility of other factors, such as support facilities and teaching methods, becomes more dominant in influencing learning outcomes. These results show that self-regulated learning and learning motivation are not the only factors that determine math learning outcomes.

Discussion

Based on research conducted by [Abror et al. \(2023\)](#) regarding the effect of self-regulated learning on mathematics learning outcomes, it states that there is no direct influence between overall learning independence on the mathematics learning outcomes of public junior high school students in Serang and Yogyakarta. However, of the six indicators of learning independence studied, only two indicators of self-consideration and self-reaction have a significant relationship to math learning outcomes. This suggests that other factors, both internal and external, may play a greater role in influencing math learning outcomes. Meanwhile, research conducted by [Nurrawi et al. \(2023\)](#) on

student learning motivation on mathematics learning outcomes revealed that student learning motivation can affect mathematics learning outcomes at the high school level. Learning motivation consists of two types, namely intrinsic and extrinsic motivation. Each type of motivation has an important role in supporting student learning activities. The higher the motivation students have, the better or better the learning outcomes they achieve.

On the other hand, this study shows that self-regulated learning and learning motivation play a role in influencing students' mathematics learning outcomes, although the level of influence differs depending on the living environment. Learners who live at home show a more positive relationship between learning motivation and learning outcomes, compared to learners who live in boarding schools. This indicates that flexibility in managing study time at home provides room for intrinsic motivation to contribute more to the achievement of learning outcomes. In contrast, the more structured learning environment in boarding schools suggests that other factors, such as teaching methods and facilities, may be more dominant in influencing learning outcomes. Self-regulated learning tends not to have a significant effect on both groups of learners, but remains important as an indicator of learning independence.

According to research conducted by [Oktavia et al. \(2023\)](#) Based on data analysis, there are significant differences in learning achievement between students who live in boarding schools and students who live at home. Students who live in boarding schools have a higher average score (84,93) than students who live at home (80,7), because they get regular learning assistance every night. However, students who live at home still have a chance to compete if they study hard.

This research provides important implications for educators and education managers to design learning strategies that are tailored to the context in which students live. This finding is in line with the research of [Oktavia et al. \(2023\)](#), which shows that students in boarding schools tend to have higher grades due to more routine learning assistance. However, this study also reveals that learners' motivation to learn at home plays a bigger role in their learning outcomes, as supported by the research of [Nurrawi et al. \(2023\)](#), which emphasizes the importance of motivation in improving mathematics achievement.

On the other hand, the results of this study differ from the findings of [Abror et al. \(2023\)](#), who stated that self-regulated learning has no significant influence on learning outcomes. In this study, although self-regulated learning does not directly affect learning outcomes significantly, this factor still plays a role as an indicator of independence in learning. Therefore, for learners who live at home, approaches that increase learning motivation, such as providing rewards or clear learning objectives, are highly recommended. Meanwhile, for learners living in boarding schools, strategies that encourage learning independence through tasks that spur initiative can be more effective. Thus, this study confirms that the learning environment has an important influence in determining the effectiveness of self-regulated learning and learning motivation on students' mathematics learning outcomes.

CONCLUSIONS

Based on the results of the analysis, this study shows that self-regulated learning and learning motivation have an influence on students' mathematics learning outcomes, although the effect is relatively small. For students who live in boarding schools, self-regulated learning and learning motivation have an influence of 7.9%, while for students who live at home the influence is slightly greater, namely 8.5%.

The results also show that students who live at home have a more positive relationship between learning motivation and learning outcomes compared to students in boarding schools. This indicates that in the home environment, learning motivation, especially intrinsic ones, is a more dominant factor in supporting mathematics learning outcomes. Meanwhile, in boarding schools, a more structured learning environment makes other factors such as teaching methods and facilities play a greater role in students' learning outcomes. Thus, although self-regulated learning and learning motivation play a role in math learning outcomes, environmental factors are also important. This finding has implications for educators in designing learning strategies that are appropriate to the context in which learners live in order to optimize their learning outcomes.

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