

The Effect of Self-Regulated Learning on Critical Thinking Skills and IPAS Teaching Readiness Among Elementary Education Students in the Era of the Merdeka Curriculum

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ABSTRACT

Critical thinking skills and teaching readiness are essential competencies that elementary education (PGSD) students must possess to prepare for the implementation of the Merdeka Curriculum. One factor believed to contribute to these two competencies is self-regulated learning. This study aims to analyze the influence of self-regulated learning on the critical thinking skills and teaching readiness of PGSD students in the IPAS program. The study employed a quantitative approach with a correlational design. The study sample consisted of 54 PGSD students from Muhammadiyah University of Mataram and Mataram University, selected using purposive sampling. Data were collected via a Likert-scale questionnaire that had passed validity and reliability tests, then analyzed using descriptive and inferential statistics, including normality tests, Pearson's correlation, simple regression, and the coefficient of determination (R^2). The results indicate that self-regulated learning has a positive and significant effect on critical thinking skills, contributing 56.4%, and a positive and significant effect on readiness to teach IPAS, contributing 9.5%. These findings suggest that enhancing self-regulated learning can strengthen critical thinking skills while supporting students' readiness as prospective elementary school teachers. The implications of this study underscore the importance of integrating strategies for developing self-regulated learning into the curriculum.

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1. INTRODUCTION

In 21st-century education, teachers are the key players who not only play a role in transferring knowledge but also in developing students' thinking skills, creativity, and problem-solving abilities [1]. In line with the implementation of the Merdeka Curriculum, prospective teachers are required to possess competencies that support the creation of

learner-centered, contextual, and adaptive learning that keeps pace with the times [2]. In the context of elementary education, the teaching of Natural and Social Sciences (IPAS) is designed to help students understand various natural and social phenomena in an integrated manner. Therefore, students in the Elementary School Teacher Education Program (PGSD), as future educators, need to equip themselves with various relevant competencies so that they can teach IPAS effectively and in accordance with the requirements of the current curriculum [3].

One of the competencies that plays a key role in supporting the success of prospective teachers is the ability to think critically [4]. Critical thinking refers to an individual's ability to analyze information in depth, identify problems, evaluate various alternative solutions, and make decisions based on logical reasoning and verifiable evidence [5]. In IPAS instruction, this skill is essential because the material covered relates to various phenomena that require analysis and reasoning [6]. Students with strong critical thinking skills will find it easier to understand concepts comprehensively and will be able to design learning activities that encourage students to engage in higher-order thinking.

In addition to critical thinking skills, teaching readiness is also a key factor in determining the quality of prospective teachers as they enter the profession [7]. Teaching readiness can be defined as a state in which a person possesses the knowledge, skills, attitudes, and self-confidence necessary to carry out the learning process [8]. In the context of IPAS instruction, teaching readiness includes the ability to understand the instructional material, develop instructional resources, select appropriate methods, manage the classroom, and assess student learning outcomes [9]. A high level of teaching readiness will help PGSD students fulfill their professional roles optimally when they enter the school environment [7].

Nevertheless, the reality on the ground shows that the teaching readiness of PGSD students still faces various challenges, particularly in teaching IPAS under the Merdeka Curriculum [10]. Some students still have difficulty developing instructional materials that align with the principles of the Merdeka Curriculum, lack confidence when conducting teaching practice, and are not yet able to integrate IPAS learning in a contextual and project-based manner [11]. In addition, there are students who have not yet been able to manage their learning process optimally, as evidenced by a lack of discipline in preparing for classes, ineffective time management, and a lack of self-assessment of their learning achievements [12]. These findings indicate that students' teaching readiness is not only influenced by external factors but is also closely related to their self-regulation skills in the learning process. Therefore, the implementation of self-regulated learning is an important aspect that requires further in-depth study in efforts to improve the teaching readiness of PGSD students [13].

Previous research on the relationship between self-regulated learning and the IPAS teaching readiness of elementary education students in the Merdeka Curriculum era has been extensively studied, including the following: [14]–[23]. Wijayati et al., (2025) indicates that: 1) students' self-regulated learning falls into the "fair" category with an overall average of 52.13, 2) students' IPAS learning outcomes in the cognitive domain fall within the "good" criterion with an overall average of 79.23, 3) Self-regulated learning

has a significant relationship with IPAS learning outcomes, as indicated by a significance value of $0.003 < 0.05$; this means that the null hypothesis (H_0) is rejected, indicating that there is a significant relationship between self-regulated learning and IPAS learning outcomes.

Hikma & Ningrum (2025): The results indicate that there is a positive and significant relationship between self-regulation and teaching readiness ($r = 0.422$, $p = 0.002 < 0.05$), as well as between competence in professional education courses and teaching readiness ($r = 0.486$, $p = 0.000 < 0.05$). Simultaneously, these two variables contribute significantly to teaching readiness. Juniayanti (2019) found that there was a significant difference in motivation to learn science between the group of students who participated in Self-Regulated Learning (SRL) with the aid of environmental media and the students who participated in the conventional learning model ($t_{table} = 1.675 > t_{value} = 35.6$). Pratiwi et al. (2021) found that (a) all students who scored above the minimum learning proficiency threshold of ≥ 75 on the critical thinking skills test were deemed to have met the proficiency standard, with an average post-test score of 91.2 and an n-gain score of 0.8 in the high category (b) students responded positively to learning using teaching materials based on Socio-Scientific Issues through interactive multimedia, as evidenced by a 92% positive response rate from students.

Based on the above discussion, it is evident that self-regulated learning has been extensively studied in relation to various aspects of education, such as learning motivation, academic achievement, and teaching readiness. However, studies examining the role of self-regulated learning on critical thinking skills and IPAS teaching readiness simultaneously among PGSD students within the context of the Merdeka Curriculum are still scarce. Thus, the novelty of this study lies in its effort to link self-regulated learning with two key competencies of prospective teachers: critical thinking skills and IPAS teaching readiness within a single integrated research framework. Based on this, this study aims to examine and analyze the influence of self-regulated learning on the critical thinking skills and IPAS teaching readiness of PGSD students in the era of the Merdeka Curriculum, so that the research results are expected to contribute to the development of the academic and professional quality of prospective elementary school teachers.

2. METHOD

This study employs a quantitative approach with a correlational design aimed at analyzing the influence of self-regulated learning on critical thinking skills and IPAS teaching readiness among PGSD students in the era of the Merdeka Curriculum. The study population consists of all students in the Elementary School Teacher Education (PGSD) program who have taken the IPAS course and completed their teaching practicum. The research sample consisted of 54 respondents from two universities, Muhammadiyah University of Mataram and Mataram University, selected through purposive sampling. This technique was chosen because the researcher established specific criteria, namely students who had taken the IPAS course and had teaching practicum experience, ensuring that the data collected were more appropriate and relevant to the research objectives.

The instrument used was a closed-ended questionnaire with a 1–5 Likert scale. The self-regulated learning variable (X) consisted of 20 statements, the critical thinking ability variable (Y1) consisted of 20 statements, and the IPAS teaching readiness variable (Y2) also consisted of 20 statements, for a total of 60 items. The questionnaires were distributed through the PGSD community WhatsApp group and individually. The instruments were first tested for validity using the product-moment correlation and for reliability using Cronbach's Alpha to ensure their suitability and consistency. The data obtained were analyzed using descriptive statistics to describe each variable, as well as inferential statistics, including the Kolmogorov-Smirnov normality test -Smirnov normality test, linearity test, Pearson product-moment correlation test, regression analysis (simple or multiple, as required by the analysis), and the coefficient of determination (R^2) to determine the extent to which self-regulated learning contributes to PGSD students' critical thinking skills and readiness to teach IPAS.

3. RESULTS AND DISCUSSION

This study began with a descriptive statistical analysis using IBM SPSS to provide an overview of the characteristics of the data for each research variable. The descriptive analysis was conducted on data obtained from 54 students in the Elementary School Teacher Education (PGSD) program who had taken the Natural and Social Sciences (IPAS) course and had teaching practicum experience. The descriptive statistics included the minimum, maximum, mean, and standard deviation of the variables self-regulated learning, critical thinking skills, and readiness to teach IPAS. The results of the descriptive analysis are presented in Table 1.

Table 1. Descriptive Analysis of X1, Y1, and Y2

	Descriptive Statistics								
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Kurtosis	Std. Error
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
X1	54	30	55	85	73.50	9.402	88.406	-1.253	.639
Y1	54	27	60	87	77.59	9.648	93.076	-.872	.639
Y2	54	31	60	91	74.00	8.696	75.623	-.510	.639
Valid N (listwise)	54								

Based on the results of the descriptive statistical analysis in Table 1, it was found that all research data came from 54 respondents (valid N = 54). The self-regulated learning variable (X1) had a minimum score of 55 and a maximum score of 85, with a score range of 30. The mean score of 73.50 and the standard deviation of 9.402 indicate that, in general, students have a relatively high level of self-regulated learning with a fairly homogeneous data distribution. The critical thinking ability variable (Y1) had a minimum score of 60 and a maximum of 87, with a range of 27, a mean of 77.59, and a standard deviation of 9.648. These results indicate that the students' critical thinking ability falls into the "good" category, with relatively small variations in scores among respondents.

Meanwhile, the IPAS teaching readiness variable (Y2) had a minimum score of 60 and a maximum of 91, with a range of 31, a mean of 74.00, and a standard deviation of 8.696, indicating that students' level of IPAS teaching readiness also tended to be good and relatively even. In addition, the kurtosis values for the three variables were -1.253 (X1), -0.872 (Y1), and -0.510 (Y2), respectively, indicating that the data distribution is platykurtic—that is, flatter than a normal distribution. Nevertheless, these kurtosis values still fall within an acceptable range for parametric analysis; thus, descriptively, it can be concluded that the data have a sufficiently good distribution and are suitable for proceeding to the inferential analysis stage to test the relationships and influences among the research variables. The results of the Kolmogorov-Smirnov normality test are presented in Table 2.

Table 2. Normality Test for the Values of X1, Y1, and Y2

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
X1	.174	54	.000	.892	54	.000
Y1	.187	54	.000	.840	54	.000
Y2	.113	54	.084	.945	54	.015

a. Lilliefors Significance Correction

Based on the results of the normality test using the Kolmogorov-Smirnov test in Table 2, the significance values obtained were 0.000 for the self-regulated learning variable (X1), 0.000 for the critical thinking ability variable (Y1), and 0.084 for the IPAS teaching readiness variable (Y2). Using a significance level of 0.05, variables X1 and Y1 have significance values less than 0.05, indicating that the data for these two variables are not normally distributed, whereas variable Y2 has a significance value greater than 0.05, indicating that it is normally distributed. Although the results of the Kolmogorov-Smirnov test indicate that not all variables meet the assumption of normality in univariate analysis, this study can still proceed with parametric analysis by considering the characteristics of the research data. In regression and correlation analysis, the primary assumption of normality is the normality of the residuals, not the normality of each variable separately. Furthermore, with a sample size of 54 respondents, parametric analysis is relatively robust against deviations from normality as long as other assumptions such as linearity and homoscedasticity are met. Therefore, further analysis can still be conducted by testing the assumption of normal residuals as the basis for the regression model's validity. The hypothesis tests used were simple regression tests between the values of X1 and Y1 and between X1 and Y2. The results of the ANOVA regression test for the X1–Y1 model are presented in Table 3.

Table 3. Regression Test of the ANOVA Model for the values of X1 and Y1

		ANOVA ^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2784.451	1	2784.451	67.389	.000 ^b
	Residual	2148.586	52	41.319		
	Total	4933.037	53			

a. Dependent Variable: Y1

b. Predictors: (Constant), X1

Based on the results of the ANOVA test on the simple regression model between self-regulated learning (X1) and critical thinking skills (Y1), as presented in Table 3, an F-value of 67.389 was obtained with a significance level (Sig.) of 0.000. This significance value is smaller than the significance level of 0.05 ($0.000 < 0.05$), so the constructed regression model is considered significant. These results indicate that self-regulated learning can significantly explain the variation in critical thinking skills among PGSD students. Thus, the simple regression model used is valid for predicting critical thinking skills based on the level of self-regulated learning. Therefore, the research hypothesis stating that self-regulated learning influences the critical thinking skills of PGSD students in the Merdeka Curriculum era is accepted, while the null hypothesis (H_0) is rejected. Furthermore, the magnitude of the effect and the direction of the relationship between the two variables were analyzed through the results of the regression coefficient and coefficient of determination (R^2) tests. The coefficient results are shown in Table 4.

Table 4. Test of the Coefficient of X1 and Y1

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		Coefficients ^a			t	Sig.
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta		
1	(Constant)	20.932	6.957		3.009	.004
	X1	.771	.094	.751	8.209	.000

a. Dependent Variable: Y1

a. Dependent Variable: Y1

Based on the results of the regression coefficient test in Table 4, the constant is 20.932, and the regression coefficient for self-regulated learning (X1) is 0.771. Thus, the resulting regression equation is $Y_1 = 20.932 + 0.771X_1$. This equation indicates that a one-unit increase in self-regulated learning is associated with a 0.771-unit increase in critical thinking ability, assuming all other variables remain constant. The results of the partial t-test showed a t-value of 8.209 with a significance level of 0.000, which is less than the significance level of 0.05 ($0.000 < 0.05$). This indicates that self-regulated learning has a positive and significant effect on the critical thinking skills of PGSD students.

Furthermore, a Standardized Beta value of 0.751 indicates that the relationship between the two variables is strong; thus, the higher the level of self-regulated learning a student possesses, the higher their critical thinking skills demonstrated in the learning process. Thus, the research hypothesis stating that self-regulated learning has a positive and significant effect on the critical thinking skills of PGSD students in the era of the Merdeka Curriculum is accepted. The hypothesis test used was a simple regression test between the values of X1 and Y2. The results of the ANOVA regression test for the X1–Y2 model are presented in Table 5.

Table 5. Regression Test of the ANOVA Model for the values of X1 and Y2

		ANOVA ^a			F	Sig.
Model		Sum of Squares	df	Mean Square		
1	Regression	381.511	1	381.511	5.470	.023 ^b
	Residual	3626.489	52	69.740		
	Total	4008.000	53			

a. Dependent Variable: Y2

b. Predictors: (Constant), X1

Based on the results of the ANOVA test on the simple regression model between self-regulated learning (X1) and IPAS teaching readiness (Y2), as presented in Table 5, an F-value of 5.470 was obtained with a significance level (Sig.) of 0.023. This significance value is smaller than the significance level of 0.05 ($0.023 < 0.05$), so the constructed regression model is considered significant. These results indicate that self-regulated learning has a significant effect on PGSD students' readiness to teach IPAS under the Merdeka Curriculum. Thus, the simple regression model used is appropriate for explaining the relationship between self-regulated learning and IPAS teaching readiness. Therefore, the research hypothesis stating that self-regulated learning influences the IPAS teaching readiness of PGSD students is accepted, while the null hypothesis (H_0) is rejected. Furthermore, to determine the direction of the effect, the magnitude of the regression coefficients, and the contribution of the self-regulated learning variable to IPAS teaching readiness, an analysis of the Coefficients test results, as shown in Table 6, is required.

Table 6. Test of the Coefficient of X1 and Y2

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	53.027	9.039		.000
	X1	.285	.122	.309	.023

a. Dependent Variable: Y2

Based on the results of the regression coefficient test in Table 6, the constant is 53.027, and the regression coefficient for self-regulated learning (X1) is 0.285. Based on these values, the simple regression equation obtained is $Y_2 = 53.027 + 0.285X_1$. This equation indicates that a one-unit increase in self-regulated learning is associated with a 0.285-unit increase in IPAS teaching readiness, assuming all other variables remain constant. The results of the partial t-test showed a t-value of 2.339 with a significance level of 0.023, which is less than the significance level of 0.05 ($0.023 < 0.05$). Thus, self-regulated learning was found to have a positive and significant effect on PGSD students' IPAS teaching readiness. Furthermore, a Standardized Beta value of 0.309 indicates that the relationship between self-regulated learning and IPAS teaching readiness falls into the moderate category. These findings suggest that the higher students' ability to independently regulate their learning process, such as setting learning goals, managing learning strategies, monitoring progress, and evaluating learning outcomes, the better their readiness to plan, implement, and evaluate IPAS instruction in accordance with the requirements of the Merdeka Curriculum.

The results of the study show that self-regulated learning has a positive and significant effect on the critical thinking skills of elementary education students. These findings indicate that the ability to manage the learning process independently is a factor that contributes to the development of critical thinking skills in prospective teachers [28]. Students who are able to set learning goals, develop learning strategies, monitor their learning progress, and evaluate their learning outcomes tend to be better at analyzing information, evaluating various problem-solving alternatives, and drawing logical conclusions [29]. This aligns with the learning characteristics of the Merdeka Curriculum,

which positions students as active learners, thereby requiring PGSD students to possess reflective and critical thinking skills as a foundation for designing innovative learning experiences. The magnitude of the regression coefficient and beta coefficient in this study also indicates that self-regulated learning is a key factor that can foster the development of students' critical thinking skills as they address various academic and professional challenges [30].

Meanwhile, the effect of self-regulated learning on IPAS teaching readiness was also found to be positive and significant, although the strength of this effect was not as great as that on critical thinking skills. These findings indicate that students who are able to effectively regulate their learning processes tend to be better prepared to carry out their duties as prospective educators, particularly in IPAS instruction [31]. This readiness is reflected in the ability to plan instruction, master the subject matter, select appropriate teaching strategies, and evaluate students' learning processes and outcomes. However, teaching readiness is a multidimensional competency; therefore, it is influenced not only by self-regulated learning but also by practical teaching experience, mastery of pedagogical and professional competencies, self-efficacy, and the ability to integrate technology into instruction [14]. Therefore, the results of this study indicate that the development of self-regulated learning needs to be supported by a variety of authentic learning experiences in order to enhance elementary education students' readiness to effectively implement IPAS-based instruction in accordance with the requirements of the Merdeka Curriculum.

4. CONCLUSION

Based on the research findings, it can be concluded that self-regulated learning has a positive and significant effect on the critical thinking skills of students in the Elementary School Teacher Education (PGSD) program. The results of the regression analysis show that self-regulated learning contributes 56.4% to critical thinking skills, while the remaining 43.6% is influenced by other factors outside the research model. These findings indicate that the better students are at independently managing, monitoring, and evaluating their learning process, the higher their critical thinking skills will be when facing various learning challenges, particularly in the implementation of the Merdeka Curriculum. In addition, self-regulated learning was also found to have a positive and significant effect on PGSD students' readiness to teach IPAS. The analysis results show that self-regulated learning contributes 9.5% to IPAS teaching readiness. In comparison, the remaining 90.5% is influenced by other factors not examined in this study, such as pedagogical competence, subject matter mastery, teaching practice experience, self-efficacy, and the ability to integrate technology into learning. Thus, self-regulated learning is an important factor in developing critical thinking skills while also supporting students' readiness as prospective elementary school teachers, although its influence on teaching readiness remains relatively limited compared to its impact on critical thinking skills.

Future research is recommended to develop a research model involving a larger number of respondents from various universities so that the research findings have a higher degree of generalizability. In addition, future research should include other variables that

may influence critical thinking skills and readiness to teach IPAS, such as self-efficacy, pedagogical competence, digital literacy, teaching practice experience, learning motivation, and mastery of IPAS content.

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