



The Effect of Digital Literacy and Self-Regulated Learning on Students' Academic Achievement at Saiburi ChaengPrachakarn School, Pattani, Southern Thailand

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Abstract: This study examined the effects of digital literacy and self-regulated learning on students' academic achievement at Saiburi ChaengPrachakarn School, Pattani, Southern Thailand. A quantitative explanatory correlational design was employed with 30 secondary school students selected through proportional random sampling. Data were collected using validated questionnaires on digital literacy and self-regulated learning, while academic achievement was measured using students' semester examination scores. Descriptive statistics and multiple linear regression were used for data analysis. The findings revealed that digital literacy positively and significantly influenced academic achievement ($\beta = 0.491, p < 0.05$). Self-regulated learning also had a positive and significant effect ($\beta = 0.503, p < 0.05$). Simultaneously, both variables significantly predicted academic achievement ($F = 304.077, p < 0.001$), explaining 95.7% of the variance ($R^2 = 0.957$). These results indicate that students with stronger digital competence and self-regulated learning skills achieve better academic outcomes. Strengthening both competencies is therefore essential for improving academic performance in technology-integrated secondary education.

Keywords: Academic achievement; Digital literacy; Quantitative research; Secondary education; Self-regulated learning

Introduction

The rapid advancement of digital technology has fundamentally transformed education in the 21st century, requiring students to develop competencies that support lifelong learning and academic success. In the era of the Industrial Revolution 4.0 and Society 5.0, schools are expected not only to integrate digital technologies into teaching and learning but also to cultivate students' ability to learn independently and adapt to technology-rich environments (Carney, 2022; Elmabaredy et al., 2024; Kastorff et al., 2026; Muliyadi et al., 2023). Consequently, digital literacy and self-regulated learning have become essential competencies for improving educational quality and preparing students to meet future challenges.

Digital literacy refers to more than the ability to operate digital devices. It encompasses information evaluation, critical thinking, digital communication, online collaboration, cybersecurity awareness, and ethical technology use (Januarti et al., 2024; Kayyali, 2024; Tomczyk et al., 2021). Likewise, self-regulated learning (SRL) describes students' capacity to plan, monitor, regulate, and evaluate their own learning processes to achieve academic goals. These competencies enable students to utilize digital learning resources effectively and independently, thereby enhancing meaningful learning experiences (Hanham et al., 2021; Suryani et al., 2021). Previous studies have consistently reported that digital literacy and self-regulated learning positively influence academic achievement, particularly in online and blended

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learning environments (Panadero et al., 2023; Rasheed et al., 2020).

Despite the growing implementation of educational technology in Southeast Asia, disparities in digital competence, technological infrastructure, and students' learning autonomy remain major challenges (Un, 2025). These issues are particularly evident in Southern Thailand, where schools continue to experience unequal access to digital learning resources, differences in teachers' digital pedagogical competence, and relatively low levels of students' self-directed learning (Yang, 2022). Although technology integration has increased, students' academic achievement remains inconsistent, indicating that access to digital technology alone is insufficient to improve learning outcomes. This condition suggests the need to investigate how digital literacy and self-regulated learning jointly contribute to academic achievement in this educational context (Peled et al., 2021).

Most previous studies have examined the effects of digital literacy and self-regulated learning separately or have focused primarily on higher education and developed educational settings. Research simultaneously investigating both variables among secondary school students in Southern Thailand remains limited. This study addresses that gap by examining the combined influence of digital literacy and self-regulated learning on students' academic achievement at Saiburi ChaengPrachakarn School, Pattani, Southern Thailand. The findings are expected to provide empirical evidence for developing technology-based learning strategies that strengthen students' digital competence, foster learning autonomy, and ultimately improve academic achievement.

Method

This study employed a quantitative research design using an explanatory correlational method to examine the effect of digital literacy and self-regulated learning on students' academic achievement. Quantitative research is appropriate for testing hypotheses and identifying relationships among variables using statistical analysis (Amaliah et al., 2023). The explanatory correlational approach was selected because it allows researchers to analyze the predictive contribution of independent variables to a dependent variable without manipulating them (Chen, 2025). The study was conducted at Saiburi ChaengPrachakarn School, Pattani, Southern Thailand, during the 2025/2026 academic year.

The population consisted of all secondary school students enrolled at the school. A total of 30 students were selected through proportional random sampling to

ensure representation across grade levels. Probability sampling techniques are recommended in quantitative research to increase generalizability and reduce bias (Oesterle et al., 2026).

Data were collected using structured questionnaires and documentation. Digital literacy (X_1) was measured using a Likert-scale instrument adapted from digital competence frameworks, which include dimensions such as information and data literacy, communication and collaboration, digital content creation, safety, and problem solving (Carretero et al., 2019; Rahimi, 2024). Self-regulated learning (X_2) was measured using a Likert-scale questionnaire based on Zimmerman's self-regulation theory, covering goal setting, strategic planning, self-monitoring, time management, and self-reflection (Kitsantas et al., 2025; Panadero et al., 2025). Each item used a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Academic achievement (Y) was obtained from students' official semester examination scores, which are commonly used as objective indicators of learning outcomes (Denmar et al., 2025).

Prior to data collection, the instruments were tested for validity and reliability. Content validity was assessed through expert judgment, while construct validity was examined using item-total correlation analysis. Reliability testing was conducted using Cronbach's Alpha coefficient, with a minimum acceptable value of 0.70 indicating satisfactory internal consistency (Sani et al., 2023).

Data analysis was performed using descriptive and inferential statistical techniques. Descriptive statistics were used to determine the mean, standard deviation, and distribution of each variable. Before hypothesis testing, classical assumption tests were conducted, including normality, linearity, multicollinearity, and heteroscedasticity tests, as recommended in regression analysis procedures (Yuniar et al., 2024). To examine the partial and simultaneous effects of digital literacy and self-regulated learning on academic achievement, multiple linear regression analysis was applied (Field, 2024). The regression model is formulated as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \epsilon \quad (1)$$

where Y represents academic achievement, X_1 represents digital literacy, X_2 represents self-regulated learning, β_0 is the constant, β_1 and β_2 are regression coefficients, and ϵ is the error term. Hypothesis testing was conducted at a significance level of 0.05. The t-test was used to analyze the partial effects of each independent variable, while the F-test was used to examine their simultaneous effect. The coefficient of determination (R^2) was calculated to determine the

proportion of variance in academic achievement explained by digital literacy and self-regulated learning.

Result and Discussion

Descriptive Statistics

Descriptive statistics were conducted to provide an overview of the characteristics of the research variables before performing inferential statistical analyses. This analysis summarizes the mean and standard deviation of digital literacy, self-regulated learning, and students' academic achievement, allowing an initial understanding of the data distribution. The descriptive results also serve as the basis for interpreting the subsequent regression analysis and hypothesis testing.

Table 1. Descriptive Statistics of Research Variables (n = 30)

Variable	N	Mean	Std. Deviation
Digital Literacy (X ₁)	30	3.60	0.29
Self-Regulated Learning (X ₂)	30	3.70	0.26
Academic Achievement (Y)	30	78.73	4.719

Table 1 shows that students' digital literacy and self-regulated learning are at a moderate level. The average academic achievement score indicates satisfactory academic performance among the sampled students.

Classical Assumption Tests

Prior to regression analysis, assumption testing was conducted. The normality test indicated that the residuals were normally distributed ($p > 0.05$). Linearity testing confirmed linear relationships between the independent variables and academic achievement.

The multicollinearity test showed tolerance values greater than 0.10 and VIF values below 10, indicating no multicollinearity issues. The heteroscedasticity test also revealed no significant heteroscedasticity symptoms. Therefore, the regression model met the required statistical assumptions.

Multiple Linear Regression Analysis

To examine the effects of digital literacy and self-regulated learning on students' academic achievement, multiple linear regression analysis was performed after all classical assumptions had been satisfied. The regression coefficients, t-values, and significance levels for each independent variable are presented in Table 2. These results indicate the contribution of each predictor to students' academic achievement.

The regression analysis indicates that digital literacy has a positive and significant effect on academic achievement. This suggests that students with better digital competence tend to achieve higher academic

scores. The ability to evaluate information, utilize digital resources, and engage effectively with technology-based learning contributes to improved academic outcomes.

Table 2. Multiple Regression Analysis Results

Variable	β	T	Sig.
Constant	-	5.637	0.000
Digital Literacy (X ₁)	0.491	4.249	0.000
Self-Regulated Learning (X ₂)	0.503	4.358	0.000

Self-regulated learning also shows a positive and significant influence on academic achievement. Students who actively set learning goals, manage their study time, and monitor their progress demonstrate better academic performance. The stronger regression coefficient suggests that self-regulated learning plays a slightly more dominant role compared to digital literacy in predicting achievement.

To determine the overall contribution of the independent variables, a simultaneous significance test (F-test) and coefficient of determination (R^2) analysis were conducted. These analyses evaluate whether digital literacy and self-regulated learning jointly influence academic achievement and measure the proportion of variance explained by the regression model. The results are presented in Table 3.

Table 3. Simultaneous Test (ANOVA) and Model Summary

Model	F	Sig.	R^2
Regression	304.077	0.000	0.957

The simultaneous test shows that digital literacy and self-regulated learning jointly have a significant effect on academic achievement. The coefficient of determination indicates that 95.7% of the variance in academic achievement is explained by the two independent variables. Although the sample size is relatively small, the findings demonstrate that both competencies meaningfully contribute to students' academic success.

Overall, the results emphasize that strengthening digital literacy and fostering self-regulated learning behaviors are important strategies for improving academic performance. In the context of technology-integrated secondary education, academic success is influenced not only by access to digital tools but also by students' ability to manage and regulate their own learning processes.

These findings are consistent with prior studies highlighting that self-regulated learning plays a central role in improving academic achievement (Susanti et al., 2024; Zimmerman et al., 2018). Furthermore, digital literacy has been shown to enhance students' engagement and ability to utilize learning technologies

effectively (Hanham et al., 2021). The combination of these two competencies is therefore crucial in supporting students' success in technology-integrated learning environments.

Conclusion

This study concludes that digital literacy and self-regulated learning have significant positive effects on students' academic achievement. Partially, digital literacy contributes to improved academic performance, indicating that students who are able to effectively access, evaluate, and utilize digital information tend to achieve higher academic scores. Likewise, self-regulated learning demonstrates a significant positive influence, suggesting that students who can set goals, manage their study time, and monitor their learning progress perform better academically. Simultaneously, both variables significantly predict academic achievement, with 95.7% of the variance explained by digital literacy and self-regulated learning. Among the two predictors, self-regulated learning shows a slightly more dominant contribution. These findings highlight that academic success in technology-integrated secondary education is not solely determined by access to digital resources, but also by students' ability to regulate and take responsibility for their own learning. Therefore, educational strategies should emphasize strengthening digital competencies alongside fostering independent and self-regulated learning behaviors to enhance students' academic outcomes.

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Author Contributions

Conceptualization, Erdiansyah and Ainun Mardiyah Lubis; methodology, Erdiansyah; software, Erdiansyah; validation, Ainun Mardiyah Lubis, Syahrudin Aritonang, and Aslamiyah Rambe; formal analysis, Erdiansyah; investigation, Erdiansyah and Mayeeta Hawae; resources, Mayeeta Hawae; data curation, Erdiansyah; writing – original draft preparation, Erdiansyah; writing – review and editing, Ainun Mardiyah Lubis, Syahrudin Aritonang, Mayeeta Hawae, and Aslamiyah Rambe. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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