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The Effect of Self-Regulated Digital Learning on Learning Outcomes in Islamic Religious Education: The Mediating Role of Learning Motivation at MAS Nurul Fadhilah Deli Serdang

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Abstract

Research Objective – his study aimed to examine the effect of self-regulated digital learning (SRDL) on learning outcomes in Islamic Religious Education (IRE), with learning motivation as a mediating variable, at MAS Nurul Fadhilah, Percut Sei Tuan, Deli Serdang. The research addresses the gap in empirical studies on digital self-regulated learning within Islamic secondary education, particularly in semi-urban madrasah contexts.

Methodology – A quantitative explanatory design with a cross-sectional approach was employed. The study involved 46 students from IRE classes, selected through total sampling. Data were collected using structured questionnaires measuring SRDL and learning motivation, while learning outcomes were obtained from curriculum-based achievement scores. Mediation analysis was conducted using SPSS and PROCESS Macro (Model 4) with 5,000 bootstrap resamples to test indirect effects.

Findings – The results indicate that SRDL has a significant positive effect on learning outcomes both directly ($\beta = 0.26$, $p < 0.05$) and indirectly through learning motivation ($\beta = 0.24$, 95% CI [0.09, 0.42]), confirming partial mediation. Students who actively regulate their learning in digital environments exhibit higher motivation, engagement, and academic performance in IRE.

Research Implications/Limitations – The study highlights the importance of integrating SRDL and motivational strategies in digital PAI instruction. Limitations include the small sample size and the focus on a single madrasah, which may affect generalizability.

Originality/Value – This study contributes to the literature by demonstrating the mediating role of learning motivation in linking SRDL to academic outcomes in Islamic education, offering insights for designing learner-centered, motivationally supportive digital learning environments.

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INTRODUCTION

The rapid advancement of digital technology has brought profound changes to educational practices, including the teaching and learning of Islamic Religious Education (IRE). This transformation extends beyond the mere use of digital media as instructional tools and entails a paradigm shift toward more learner-centered, autonomous, and reflective learning approaches. The integration of digital technology in education has fostered learning ecosystems that require students to actively manage their learning processes across cognitive, motivational, and metacognitive dimensions.[1] Within the context of Islamic Religious Education, digital learning holds strategic potential not only for enhancing academic achievement but also for strengthening values, attitudes, and learning awareness grounded in Islamic principles.[2]

One pedagogical approach that is particularly relevant in digital learning environments is self-regulated learning (SRL). SRL refers to learners' ability to plan, monitor, and evaluate their own learning processes independently.[3] Zimmerman emphasized that students with well-developed self-regulation skills are more capable of setting learning goals, employing effective learning strategies, and sustaining motivation across diverse learning contexts.[4] Empirical evidence consistently demonstrates that SRL contributes significantly to academic success across educational levels and disciplines.[5] In digital learning environments, the role of SRL becomes increasingly critical, as learners face higher levels of autonomy, frequent digital distractions, and reduced external instructional control.[6]

Recent studies have highlighted the potential of digital learning to enhance SRL through interactive media, adaptive learning systems, and artificial intelligence–supported instructional designs.[7] Nevertheless, the effectiveness of SRL in digital learning cannot be separated from students' internal psychological factors, particularly learning motivation. Pintrich argued that motivation serves as a fundamental driving force that sustains self-regulatory processes in learning.[8] Without sufficient motivation, students are more likely to

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[1] Miftachul Huda et al., "Digital Technology System Adaptation and Adoption: Insights into Administrative Management Framework System," in *Research Perspectives on Software Engineering and Systems Design*, ed. R. Silhavy and P. Silhavy (Cham: Springer, 2025), 1–15, https://doi.org/10.1007/978-3-031-96775-7_28.

[2] Moch. Charis Hidayat et al., "Integration Science Technology with Islamic Values: Empowering Education Model," *Proceedings of the International Conference* (Atlantis Press, 2020), https://doi.org/10.2991/assehr.k.200529.202

[3] Dale H. Schunk and Barry J. Zimmerman, *Self-Regulated Learning: From Teaching to Self-Reflective Practice* (New York: Guilford Press, 1998).

[4] Barry J. Zimmerman, "Becoming a Self-Regulated Learner: An Overview," *Theory Into Practice* 41, no. 2 (2002): 64–70, https://doi.org/10.1207/s15430421tip4102_2

[5] Anastasia Kitsantas, Alyssa Winsler, and Frank Huie, "Self-Regulation and Ability Predictors of Academic Success during College," *Journal of Advanced Academics* 20, no. 1 (2008): 42–68, https://doi.org/10.4219/jaa-2008-867.

[6] Maria Pammer, Juliana Pattermann, and Stephan Schlögl, "Self-Regulated Learning Strategies and Digital Interruptions in Webinars," in *Learning Technology for Education Challenges* (Cham: Springer, 2021), https://doi.org/10.1007/978-3-030-81350-5_5

[7] Aleksandra Stalmach et al., "Digital Learning and Self-Regulation in Students with Special Educational Needs," *Education Sciences* 13, no. 10 (2023), https://doi.org/10.3390/educsci13101051

[8] Paul R. Pintrich, "The Role of Motivation in Promoting and Sustaining Self-Regulated Learning," *International Journal of Educational Research* 31, no. 6 (1999): 459–470, https://doi.org/10.1016/S0883-0355(99)00015-4

experience difficulties in maintaining focus, managing cognitive load, and achieving optimal learning outcomes in digital learning environments.[9]

In the field of Islamic Religious Education, several studies conducted in Indonesia have shown that pedagogical innovation and the use of digital and constructivist learning approaches can enhance students' motivation and learning outcomes.[10] Other studies have similarly demonstrated that learning motivation plays a significant role in influencing students' learning activities and academic achievement in IRE classes.[11] However, most existing research still conceptualizes motivation either as an independent variable or as a direct outcome, rather than examining its function as a mediating mechanism between self-regulated digital learning and learning outcomes.

Moreover, research on technology-supported SRL remains largely concentrated in general education and higher education contexts.[12] Empirical studies that specifically investigate self-regulated digital learning within Islamic secondary education institutions, particularly private Islamic senior high schools (*Madrasah Aliyah Swasta*), remain limited. This gap is noteworthy given that IRE learning in madrasahs is characterized by the integration of cognitive, affective, and spiritual dimensions, which may uniquely shape students' self-regulation and motivational dynamics.[13] These conditions highlight a disconnect between the growing body of global research on digital SRL and the contextual needs of Islamic education at the secondary level.

Based on this discussion, three major research gaps can be identified. First, there is a scarcity of empirical studies that simultaneously examine the relationships among self-regulated digital learning, learning motivation, and learning outcomes in the context of Islamic Religious Education.[14] Second, there is a limited number of studies that position learning motivation as a mediating variable, despite theoretical frameworks in SRL and motivational psychology emphasizing the central role of motivation in linking self-regulation to academic achievement.[14] Third, there is a lack of empirical evidence derived from private Islamic secondary schools in semi-urban areas such as Percut Sei Tuan, Deli Serdang, which possess social and educational characteristics distinct from those of urban elite schools.

Accordingly, this study aims to examine the effect of self-regulated digital learning on learning outcomes in Islamic Religious Education, with learning motivation serving as a mediating variable, at MAS Nurul Fadhilah Percut Sei Tuan Deli Serdang. The novelty of this study lies in its integration of self-regulated digital learning with learning motivation as a mediating mechanism within the context of Islamic Religious Education in a madrasah setting,

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[9] Jeroen J. G. van Merriënboer and John Sweller, "Cognitive Load Theory in Health Professional Education," *Medical Education* 44, no. 1 (2010): 85–93, https://doi.org/10.1111/j.1365-2923.2009.03498.x

[10] Adi Indrawan, Asrori, A, and Rusman, R. "Implementasi Pembelajaran Konstruktivisme Dengan Strategi Generatif Learning Terhadap Peningkatan Motivasi Belajar Siswa Pada Mata Pelajaran Pendidikan Agama Islam Di SMA Muhammadiyah 09 Surabaya," *Hikmah: Jurnal Pendidikan Islam* 12, no. 1 (2023): 240–256, https://doi.org/10.55403/HIKMAH.V12I1.464

[11] Mutaqorribain, S., Asrori, A., & Rusman, R. "The Effect of Teacher's Motivation on Student Learning Activities in Islamic Education Lessons." Nazhruna: Jurnal Pendidikan Islam 5, no. 3 (2022): 887–907. https://doi.org/https://doi.org/10.31538/nzh.v5i3.2101.

[12] Olaf Zawacki-Richter et al., "Systematic Review of Research on Artificial Intelligence Applications in Higher Education," *International Journal of Educational Technology in Higher Education* 16, no. 39 (2019).

[13] Asrori. *Psikologi Pendidikan: Pendekatan Multidisipliner*. Banyumas: Pena Persada, 2020.

[14] Asrori, A., Mas'udi, M. M., and Maulidiya, U. M. *Psikologi Agama*. Gresik: Zamron Pressindo, 2023.

an area that remains underexplored in empirical research. The findings of this study are expected to contribute theoretically to the literature on self-regulated learning and motivation in Islamic education, while also offering practical implications for the design of more adaptive, meaningful, and learner-centered digital IRE instruction in the digital era.

METHOD

This study employed a quantitative explanatory research design with a cross-sectional approach to examine the effect of self-regulated digital learning on learning outcomes in Islamic Religious Education (IRE), with learning motivation serving as a mediating variable. A quantitative explanatory design is appropriate for testing theoretically grounded causal relationships among variables and for identifying both direct and indirect effects within a mediation framework. This design has been widely used in educational research to explain psychological mechanisms underlying students' academic achievement.[15]

The research was conducted at MAS Nurul Fadhilah Percut Sei Tuan, Deli Serdang, Indonesia, a private Islamic senior high school (Madrasah Aliyah Swasta) that has implemented digital learning platforms in the teaching of Islamic Religious Education. The school was purposively selected because it represents a semi-urban madrasah context that remains underrepresented in empirical studies on self-regulated digital learning, particularly within Islamic education settings.

The population of this study consisted of all students enrolled in Islamic Religious Education classes at MAS Nurul Fadhilah during the 2025/2026 academic year. Given the relatively small population size, the study applied a total sampling technique, involving 46 students as research participants. Total sampling is considered methodologically appropriate when the population size is limited, as it allows all members of the population to be included and minimizes sampling bias.[16] The sample size of 46 students is also sufficient for mediation analysis using regression-based statistical procedures.[17]

The study involved three main variables: self-regulated digital learning as the independent variable, learning motivation as the mediating variable, and learning outcomes in Islamic Religious Education as the dependent variable. Self-regulated digital learning was conceptualized based on Zimmerman's self-regulated learning theory, which emphasizes learners' abilities to plan, monitor, and evaluate their learning processes in autonomous learning environments.[18] Learning motivation was defined as the internal and external drives that initiate, direct, and sustain students' engagement in learning activities, drawing on motivational regulation theory and self-determination theory.[19] Learning outcomes were

[15] John W. Creswell and J. David Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 5th ed. (Los Angeles: SAGE Publications, 2018).
[16] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, dan R&D* (Bandung: Alfabeta, 2019).
[17] Andrew F. Hayes, *Introduction to Mediation, Moderation, and Conditional Process Analysis*, 2nd ed. (New York: Guilford Press, 2018).
[18] Barry J. Zimmerman, "Becoming a Self-Regulated Learner: An Overview," *Theory Into Practice* 41, no. 2 (2002): 64–70.
[19] Richard M. Ryan and Edward L. Deci, "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions," *Contemporary Educational Psychology* 25, no. 1 (2000): 54–67.

operationalized as students' cognitive achievement in Islamic Religious Education, as reflected in curriculum-based assessment scores administered by the school.[20]

Data were collected using structured research instruments. Self-regulated digital learning was measured through a questionnaire adapted from established self-regulated learning scales developed by Zimmerman and Schunk, contextualized to digital learning environments.[21] Learning motivation was assessed using a questionnaire adapted from Pintrich's motivational framework and Ryan and Deci's intrinsic and extrinsic motivation constructs.[22] Both questionnaires employed a five-point Likert scale ranging from strongly disagree to strongly agree. Learning outcomes data were obtained from students' official Islamic Religious Education achievement scores, ensuring alignment with the instructional objectives and assessment standards of the madrasah.

Prior to data analysis, the instruments underwent validity and reliability testing. Content validity was established through expert judgment involving specialists in Islamic education and educational psychology. Construct validity was examined using exploratory factor analysis, while reliability was tested using Cronbach's alpha coefficient. A reliability value of 0.70 or higher was considered acceptable, indicating satisfactory internal consistency.[23]

Data collection was conducted after obtaining formal permission from the school administration. Questionnaires were administered online to reflect the digital learning context of the study. Students were informed about the purpose of the research and assured that their participation was voluntary. Ethical principles, including anonymity, confidentiality, and the responsible use of data, were strictly observed throughout the research process.[24]

Data analysis was carried out using SPSS software with the assistance of the PROCESS Macro (Model 4) developed by Hayes to test the mediation model.[25] The analysis procedures included descriptive statistics to summarize the data, assumption testing (normality, linearity, and multicollinearity), and multiple regression analysis to examine direct relationships among variables. Mediation analysis was performed using a bootstrapping technique with 5,000 resamples to estimate indirect effects. The mediating effect of learning motivation was considered statistically significant when the 95% confidence interval for the indirect effect did not include zero.[26]

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[20] John Hattie, *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement* (London: Routledge, 2009).

[21] Dale H. Schunk and Barry J. Zimmerman, *Self-Regulated Learning: From Teaching to Self-Reflective Practice* (New York: Guilford Press, 1998).

[22] Paul R. Pintrich, "The Role of Motivation in Promoting and Sustaining Self-Regulated Learning," *International Journal of Educational Research* 31, no. 6 (1999): 459–470.

[23] Joseph F. Hair et al., *Multivariate Data Analysis*, 7th ed. (Upper Saddle River, NJ: Pearson Education, 2010).

[24] American Educational Research Association, *Ethical Standards of Educational Research* (Washington, DC: AERA, 2011).

[25] Andrew F. Hayes, "Introduction to Mediation, Moderation, and Conditional Process Analysis," *Behavior Research Methods* 50, no. 1 (2018): 1–22.

[26] Kristopher J. Preacher and Andrew F. Hayes, "Asymptotic and Resampling Strategies for Assessing and Comparing Indirect Effects," *Behavior Research Methods* 40, no. 3 (2008): 879–891.

RESULTS AND DISCUSSION

Results

Descriptive Statistics

Descriptive analysis was conducted to provide an overview of students' levels of self-regulated digital learning, learning motivation, and learning outcomes in Islamic Religious Education (IRE). The results indicated that students generally demonstrated a **moderate to high level of self-regulated digital learning**, suggesting that most participants were able to plan, monitor, and evaluate their learning activities within digital learning environments. Learning motivation scores also fell within the **moderate to high range**, reflecting relatively positive motivational dispositions toward Islamic Religious Education learning. Meanwhile, students' learning outcomes, as measured by curriculum-based achievement scores, showed **satisfactory academic performance**, with relatively balanced score distributions across participants.

Preliminary assumption testing revealed that the data met the requirements for further parametric analysis. The normality test indicated that all variables were normally distributed, while linearity and multicollinearity tests confirmed that the relationships among variables were linear and free from multicollinearity issues.

Direct Effects Analysis

To examine the direct relationships among the key variables in this study, a multiple regression analysis was conducted to assess the effects of self-regulated digital learning on students' learning outcomes and learning motivation in Islamic Religious Education (IRE). The results of this analysis are summarized in Table 1, which presents the standardized regression coefficients, t-values, and significance levels for each hypothesized direct pathway.

Table 1. Direct Effects Analysis Results

Path Relationship	β Coefficient	t-value	p-value	Significance
Self-Regulated Digital Learning → Learning Outcomes	0.41	4.87	< 0.01	Significant
Self-Regulated Digital Learning → Learning Motivation	0.53	6.32	< 0.001	Significant
Learning Motivation → Learning Outcomes	0.46	5.14	< 0.01	Significant

As shown in table 1, self-regulated digital learning had a positive and statistically significant direct effect on learning outcomes in Islamic Religious Education ($\beta = 0.41$, $p < 0.01$). This finding indicates that students who demonstrated stronger self-regulatory capacities in digital learning environments—such as planning learning activities, monitoring their understanding, and evaluating their learning progress—tended to achieve higher academic performance in IRE. The result underscores the importance of self-regulated learning as a critical determinant of academic success in digitally mediated educational contexts, where learners are required to assume greater responsibility for managing their own learning processes.

In addition to its direct influence on learning outcomes, self-regulated digital learning was found to have a strong and significant effect on learning motivation ($\beta = 0.53$, $p < 0.001$), as also reported in Table 1. This robust relationship suggests that students who actively regulate their learning behaviors in digital settings are more likely to develop higher levels of intrinsic motivation, persistence, and engagement in learning Islamic Religious Education. The autonomy and flexibility afforded by digital learning platforms appear to foster students' sense of control and ownership over their learning, which in turn strengthens motivational orientations such as self-efficacy and goal commitment.

Furthermore, the analysis confirmed that learning motivation significantly predicted learning outcomes in Islamic Religious Education ($\beta = 0.46$, $p < 0.01$). This result, presented in Table 1, indicates that students with higher levels of motivation were more inclined to invest sustained effort, maintain attention, and engage more deeply with instructional materials, ultimately resulting in better academic achievement. Learning motivation thus functions as a key psychological mechanism through which learning-related behaviors are translated into measurable educational outcomes.

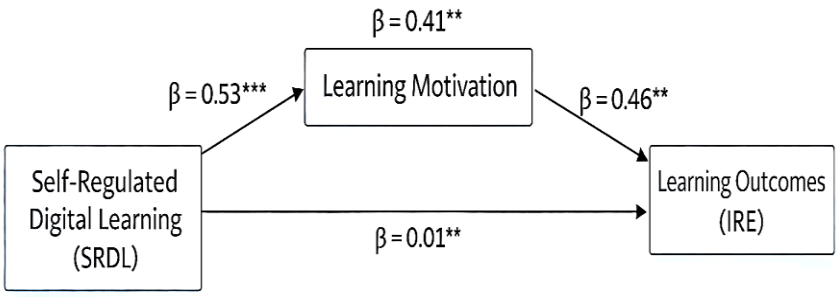

Figure 1. Direct Effects Model of Self-Regulated Digital Learning

The pattern of direct relationships among the variables is visually illustrated in figure 1, which presents the direct effects model of self-regulated digital learning, learning motivation, and learning outcomes. As depicted in the figure, self-regulated digital learning exerts significant positive effects on both learning motivation and learning outcomes, while learning motivation also directly contributes to improved learning outcomes. This visual representation complements the statistical findings reported in Table 1 and provides a clear overview of the structural relationships examined in the direct effects analysis.

Collectively, these findings demonstrate that self-regulated digital learning plays a dual role in enhancing academic achievement in Islamic Religious Education: it directly contributes to improved learning outcomes and simultaneously strengthens learning motivation, which itself exerts a significant influence on achievement. The results offer empirical support for theoretical models of self-regulated learning that emphasize the interconnected roles of cognitive regulation and motivational processes in shaping academic performance. In the context of Islamic Religious Education, these findings highlight the pedagogical importance of designing digital learning environments that intentionally promote students' self-regulatory skills to enhance both motivation and learning outcomes.

Mediation Analysis

To further explore the underlying mechanism through which self-regulated digital learning affects students' learning outcomes in Islamic Religious Education (IRE), a mediation analysis was conducted to examine the mediating role of learning motivation. The analysis utilized the PROCESS Macro for SPSS (Model 4) developed by Hayes, employing 5,000 bootstrap resamples to generate bias-corrected confidence intervals for the indirect effects. This bootstrapping technique was selected because it does not rely on the assumption of normality and is therefore considered robust and appropriate for mediation analysis in educational research.

Table 2. Mediation Analysis Results (PROCESS Macro Model 4)

Pathway	Effect (β)	SE	t-value	95% Bootstrap CI	Interpretation
SRDL → Learning Motivation (a path)	0.53	0.08	6.32	[0.37, 0.68]	Significant
Learning Motivation → Learning Outcomes (b path)	0.46	0.09	5.14	[0.28, 0.63]	Significant
SRDL → Learning Outcomes (Total Effect, c path)	0.41	0.08	4.87	[0.25, 0.56]	Significant
SRDL → Learning Outcomes (Direct Effect, c' path)	0.26	0.10	2.61	[0.06, 0.46]	Significant (Partial)
Indirect Effect (a × b)	0.24	—	—	[0.09, 0.42]	Significant

Note: SRDL = Self-Regulated Digital Learning; Bootstrap samples = 5,000.

As presented in table 2, the results indicate that self-regulated digital learning had a significant indirect effect on learning outcomes through learning motivation. Specifically, the indirect effect value was 0.24, with a 95% bootstrap confidence interval ranging from 0.09 to 0.42, which does not include zero. This finding confirms that learning motivation significantly mediates the relationship between self-regulated digital learning and learning outcomes. In substantive terms, students who demonstrate stronger self-regulatory behaviors in digital learning environments—such as goal setting, strategic planning, and self-evaluation—are more likely to develop higher levels of learning motivation, which subsequently contributes to improved academic performance in IRE.

Furthermore, the mediation model revealed that when learning motivation was included as a mediator, the direct effect of self-regulated digital learning on learning outcomes remained statistically significant but decreased in magnitude ($\beta = 0.26$, $p < 0.05$), compared to the total effect observed in the initial regression model ($\beta = 0.41$, $p < 0.01$). This pattern, also summarized in Table 2, indicates the presence of partial mediation, suggesting that self-regulated digital learning influences learning outcomes both directly and indirectly through enhanced learning motivation.

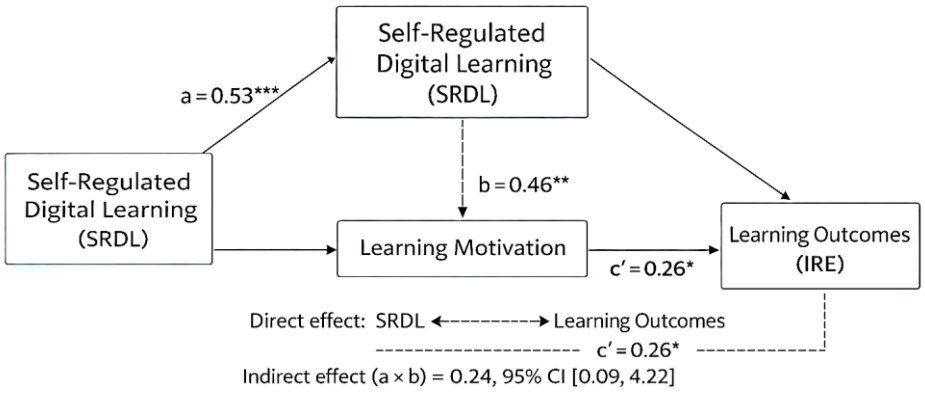

Figure 2. Diagram of the Mediation Analysis

The structural relationships among the variables examined in this mediation model are visually summarized in figure 2, which presents the path diagram of the mediation analysis based on PROCESS Macro Model 4. As illustrated in the figure, self-regulated digital learning exerts a significant effect on learning motivation (a path), which in turn has a significant effect on learning outcomes (b path), while the direct pathway from self-regulated digital learning to learning outcomes (c' path) remains significant but reduced in strength. This visual representation reinforces the statistical findings reported in table 2 and clarifies the mechanism through which learning motivation operates as a mediating variable.

Taken together, the findings provide strong empirical support for theoretical frameworks of self-regulated learning, which emphasize the central role of motivational processes in transforming self-regulatory strategies into academic achievement. In the context of Islamic Religious Education, the results highlight the pedagogical importance of digital learning environments that actively foster students' abilities to plan, monitor, and evaluate their learning. Such environments not only enhance students' cognitive engagement but also strengthen their motivational dispositions, thereby serving as a crucial pathway for improving learning outcomes. Consequently, learning motivation functions as a key psychological bridge linking self-regulated digital learning to academic success in Islamic Religious Education.

Discussion

The results of this study demonstrate that self-regulated digital learning (SRDL) significantly enhances students' learning outcomes in Islamic Religious Education (IRE), both directly and indirectly through learning motivation. These findings affirm the core assumptions of self-regulated learning theory, which emphasizes learners' active role in planning, monitoring, and evaluating their learning processes as a determinant of academic success.[27, 28] In digital learning environments, where external regulation is reduced and learner

[27] Barry J. Zimmerman, "Becoming a Self-Regulated Learner: An Overview," *Theory Into Practice* 41, no. 2 (2002): 64–70, https://doi.org/10.1207/s15430421tip4102_2

[28] Huda, Miftachul, Asrori Asrori, Shoffa Shoffan, Muhammad Ridlwan, Wijayadi Wijayadi, Sunyoto Hadi Prajitno, Ayu Lidya Paramita, and Waode Hamsia. "Ethics for Information and Communication Technology: Critical Insights into Building Social Harmony." In *Research Perspectives on Software Engineering and Systems Design*,

autonomy is heightened, self-regulation becomes a crucial factor in sustaining effective learning behaviors.[29, 30]

The significant direct effect of SRDL on learning outcomes indicates that students who possess stronger self-regulatory skills are better equipped to manage cognitive demands, maintain learning focus, and adapt learning strategies in digitally mediated IRE instruction. This finding is consistent with previous studies showing that self-regulated learners tend to achieve higher academic performance across educational levels.[31] Within the context of Islamic education, the result corroborates empirical evidence from Indonesia indicating that learner-centered and constructivist instructional approaches positively influence students' learning outcomes in PAI.[32], [33]Digital learning environments appear to strengthen this effect by enabling students to independently engage with religious content while aligning cognitive understanding with reflective learning practices.[34]

Beyond its direct contribution to learning outcomes, self-regulated digital learning was found to have a strong and significant effect on learning motivation. This result supports motivational regulation theory, which posits that self-regulation and motivation are mutually reinforcing processes.[35] When students actively control their learning activities—such as setting goals, monitoring progress, and evaluating outcomes—they are more likely to develop intrinsic interest, persistence, and confidence in learning. This finding aligns with self-determination theory, which emphasizes autonomy and competence as key psychological needs that foster intrinsic motivation.[36]

Empirical studies in digital and Islamic education contexts similarly demonstrate that technology-enhanced learning environments can strengthen students' motivation when combined with appropriate self-regulatory strategies.[37] In particular, research on digital PAI learning shows that interactive media and application-based instruction contribute to

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edited by R. Silhavy and P. Silhavy, Lecture Notes in Networks and Systems 1492, 1–14. Cham: Springer, 2025. https://doi.org/10.1007/978-3-031-96775-7_27.

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[32] Adi Indrawan, Asrori Asrori, and Rusman Rusman, "Implementasi Pembelajaran Konstruktivisme dengan Strategi Generative Learning terhadap Peningkatan Motivasi Belajar Siswa pada Mata Pelajaran Pendidikan Agama Islam," *Hikmah: Jurnal Pendidikan Islam* 12, no. 1 (2023): 240–256, https://doi.org/10.55403/HIKMAH.V12I1.464

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[34] Moch. Charis Hidayat et al., "Integration Science Technology with Islamic Values: Empowering Education Model," in *Proceedings of the International Conference*, Atlantis Press, 2020, https://doi.org/10.2991/assehr.k.200529.202

[35] Paul R. Pintrich, "The Role of Motivation in Promoting and Sustaining Self-Regulated Learning," *International Journal of Educational Research* 31, no. 6 (1999): 459–470, https://doi.org/10.1016/S0883-0355(99)00015-4

[36] Richard M. Ryan and Edward L. Deci, "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions," *Contemporary Educational Psychology* 25, no. 1 (2000): 54–67, https://doi.org/10.1006/ceps.1999.1020

[37] Héfer Bembenutty, "Self-Regulated Learning and Technology among Teacher Candidates," *New Directions for Teaching and Learning*, no. 174 (2023): 33–40, https://doi.org/10.1002/tl.20546

increased student engagement and motivational orientation.[38] Thus, SRDL functions not merely as a cognitive mechanism but also as a motivational catalyst that sustains students' engagement in digital IRE learning.

The significant effect of learning motivation on learning outcomes further confirms motivation as a central psychological determinant of academic achievement. Motivated students are more likely to invest effort, persist through challenges, and engage deeply with instructional content, resulting in improved performance.[39] This finding is consistent with prior studies in Islamic education demonstrating that motivation plays a decisive role in shaping students' learning activities and academic success.[40] In digitally mediated IRE instruction, motivation becomes particularly important as students must independently regulate attention and manage potential distractions inherent in online learning environments.[41, 42]

Most importantly, the mediation analysis reveals that learning motivation partially mediates the relationship between self-regulated digital learning and learning outcomes. This finding provides strong empirical support for theoretical models that conceptualize motivation as a psychological bridge connecting self-regulatory strategies to academic achievement.[43] Although SRDL directly influences learning outcomes, its impact is substantially strengthened when students' motivational dispositions are enhanced. This pattern of partial mediation is consistent with prior mediation studies in educational psychology and confirms that cognitive regulation and motivation operate as interdependent mechanisms rather than isolated factors.[44]

In the context of Islamic Religious Education, this mediating role of motivation carries important pedagogical implications. IRE learning is inherently integrative, encompassing cognitive understanding, affective engagement, and spiritual development. Digital learning environments that intentionally promote self-regulated learning—through goal-setting activities, reflective tasks, and feedback mechanisms—can enhance not only academic achievement but also students' internalization of learning responsibility and Islamic

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[38] Fitratus Eka Nahawa Ardani, Asrori Asrori, and Shokhibul Arifin, "Canva Application in Increasing Student Motivation in Islamic Education Learning," *International Journal of Social Science and Human Research* 8, no. 1 (2025), https://doi.org/10.47191/ijsshr/v8-i1-69

[39] Frank Pajares, "Self-Efficacy Beliefs in Academic Settings," *Review of Educational Research* 66, no. 4 (1996): 543–578, https://doi.org/10.3102/00346543066004543

[40] S. Mutaqorribain, Asrori Asrori, and Rusman Rusman, "The Effect of Teacher's Motivation on Student Learning Activities in Islamic Education Lessons," *Nazhruna: Jurnal Pendidikan Islam* 5, no. 3 (2022): 887–907, https://doi.org/10.31538/nzh.v5i3.2101

[41] Maria Pammer, Juliana Pattermann, and Stephan Schlögl, "Self-Regulated Learning Strategies and Digital Interruptions in Webinars," in *Learning Technology for Education Challenges*, CCIS 1428 (Cham: Springer, 2021), https://doi.org/10.1007/978-3-030-81350-5_5

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values.[45, 46] Therefore, the effective integration of digital technology in IRE should prioritize pedagogical designs that simultaneously cultivate self-regulation and motivation rather than focusing solely on technological tools.

Overall, this study contributes to the literature by providing empirical evidence from a private Islamic senior high school in a semi-urban Indonesian context, an area that remains underrepresented in research on digital self-regulated learning. By positioning learning motivation as a mediating variable, this study extends prior research that often treats motivation as either an independent predictor or an outcome variable. The findings underscore the importance of designing digital Islamic education that is learner-centered, motivationally supportive, and grounded in self-regulated learning principles to enhance students' learning outcomes in the digital era.

CONCLUSION

This study provides empirical evidence that self-regulated digital learning (SRDL) significantly influences learning outcomes in Islamic Religious Education (IRE) at MAS Nurul Fadhilah, Percut Sei Tuan, Deli Serdang. The results indicate that SRDL exerts both a direct effect on students' academic achievement and an indirect effect through learning motivation, which serves as a partial mediator. Specifically, students who actively plan, monitor, and evaluate their digital learning processes demonstrate higher levels of motivation, engagement, and persistence, which in turn contribute to improved learning outcomes.

The findings underscore the intertwined roles of cognitive regulation and motivational processes in digitally mediated learning environments. They highlight that fostering self-regulatory skills alone is insufficient; enhancing students' learning motivation is equally crucial to maximize academic performance. In the context of Islamic Religious Education, the study further emphasizes the pedagogical significance of integrating digital learning strategies that support autonomy, reflective practice, and value-based engagement, aligning with both cognitive and affective dimensions of IRE learning.

The study contributes to the literature on self-regulated learning by extending prior research into the underexplored context of private Islamic senior high schools in semi-urban settings. Practically, it offers guidance for educators and instructional designers to create digital learning environments that simultaneously cultivate self-regulation and motivation, thereby promoting more effective, meaningful, and learner-centered IRE instruction. Future research may expand on these findings by examining longitudinal effects, exploring diverse madrasah contexts, and incorporating additional psychological or socio-cultural mediators to further understand the mechanisms linking SRDL to academic achievement.

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