



Balancing AI and Learning: Examining the Effects of Generative AI Dependency and Digital Multitasking on University Students' Self-Regulated Learning

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Abstract: This study aims to examine the effects of generative AI dependency and digital multitasking habits on the quality of self-regulated learning (SRL) among university students, both individually and jointly. The study employed a quantitative approach involving 300 active students from five study programs at the Purwakarta Campus of Universitas Pendidikan Indonesia, who were selected through purposive sampling. Data were collected using four-point Likert-scale instruments that met established validity and reliability criteria. The data were analyzed using multiple linear regression, preceded by classical assumption tests for normality, linearity, multicollinearity, and heteroscedasticity. The results indicated that generative AI dependency was positively and significantly associated with SRL ($B = 0.213$, $p = .004$), as was digital multitasking ($B = 0.178$, $p = .009$). Simultaneously, both predictors were significantly associated with students' SRL, $F = 27.843$, $p < .001$, and the regression model explained 15.8% of the variance in SRL. These findings suggest that, within the context of this study, moderate levels of generative AI use and digital multitasking did not substantially undermine students' self-regulatory capacity. Rather than restricting generative AI use, higher education institutions should provide structured guidance on effective AI engagement, including prompt formulation strategies and reflective evaluation of AI-generated outputs, and integrate such guidance into learning task design. Such an approach may help ensure that students' interaction with generative AI strengthens rather than substitutes for their self-regulatory capacity.

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Introduction

In recent years, generative artificial intelligence (AI) has become an inseparable part of students' academic lives (Abbi et al., 2026). Large language model (LLM) based platforms such as ChatGPT, Claude, Gemini, and Copilot are now deeply embedded in everyday academic routines, from searching for references and drafting outlines to completing assignments almost instantaneously (Suryawijaya et al., 2025). The convenience offered by generative AI is often described as an illusion of ease: the perception that academic tasks have become lighter because AI can produce coherent, well-structured responses within seconds, which in turn leads students to increasingly surrender their thinking processes to these systems (Fathony et al., 2024). This phenomenon has emerged alongside a growing tendency toward digital multitasking among students, the practice of using multiple digital platforms simultaneously within a single study session. Rather than operating in isolation, these two habits are believed to reinforce one another and give rise to new learning patterns that may fundamentally undermine the depth of academic engagement (Deng et al., 2024). This situation raises serious concerns about the quality of students' self-regulated learning



(SRL), as both factors simultaneously erode the capacity to plan, monitor, and evaluate one's own learning process.

A growing body of research has documented the negative consequences of AI dependency on student learning. Georgiou, (2025) found that uncontrolled AI use tends to diminish intrinsic motivation and reduce cognitive effort, a pattern the researcher characterized as the emergence of a generation of “lazy thinkers” shaped by reliance on ChatGPT. Similarly, Suryanto et al., (2025) reported that students who are heavily dependent on AI demonstrate declining abilities in critical thinking and independent problem-solving. Ulfah., (2024) and Firdaus et al., (2025) further found that excessive AI dependency consistently correlates with a weakening of students' analytical and creative capacities, ultimately affecting the quality of their academic output. This tendency is also closely tied to increased academic procrastination, as the ease with which AI generates instant answers encourages students to delay their work until deadlines approach, rather than developing systematic learning strategies. On the other side of the equation, digital multitasking has shown equally significant negative effects on students' cognitive processes. Costanzo, (2024) demonstrated that constant switching between platforms imposes a substantial cognitive load and hinders deep information processing. This finding is reinforced by a meta-analysis conducted by (Parry & Le Roux, 2021), which showed that students with higher levels of media multitasking tend to exhibit lower cognitive control in real-life situations, even as they often overestimate their own ability to handle multiple tasks simultaneously, a bias that paradoxically drives further multitasking behavior. The sustained fragmentation of attention caused by notifications and platforms-switching ultimately erodes the capacity for deep information processing that quality learning demands. When both habits converge in students' academic routines, their combined impact on learning quality is likely to be amplified, as they simultaneously and jointly strain students' cognitive resources.

This study is grounded in Zimmerman, (2002) self-regulated learning theory, which conceptualizes SRL as an active, cyclical process through which students plan, monitor, and evaluate their own learning. All three phases are susceptible to deterioration when students habitually delegate their cognitive work to AI (Liu, 2026; Xu et al., 2025), while their attention is simultaneously diverted by digital multitasking habits, a behavior that several researchers have characterized as a form of self-regulatory failure in learning (Deng et al., 2024). Although each variable has been examined in the literature, the majority of existing studies have addressed them independently. Prior research has generally focused on either AI dependency in relation to academic self-efficacy (Zhang et al., 2024) or media multitasking in relation to cognitive control (Parry & Le Roux, 2021), without placing both within a unified analytical framework centered on SRL. As a result, a comprehensive empirical picture of how AI dependency and digital multitasking operate simultaneously to shape students' self-regulatory capacity has yet to emerge.

The scientific novelty of this study lies in its integration of two technologies phenomena that have previously been studied in isolation, generative AI dependency and digital multitasking habits, into a single analytical model with SRL as the dependent variable. This approach differs from earlier studies that typically examined the isolated effect of one variable on academic outcomes and were therefore unable to account for the potential simultaneous effects of both digital habits. Furthermore, this study makes a contextual contribution by focusing on university students in Indonesia, a population whose patterns of AI adoption and digital behavior may differ meaningfully from those documented in more extensively studied higher-income country contexts. This distinction is particularly relevant



given Indonesia's persistent urban–rural digital disparities and locally specific infrastructural and sociocultural conditions that shape how AI is adopted and used (Aziz et al., 2025) as well as the still-developing institutional frameworks for AI adoption within Indonesian higher education, which differ structurally from those in more established, higher-income educational systems (Achruh et al., 2024).

However, an alternative body of research suggests that generative AI dependency and digital multitasking do not uniformly undermine self-regulated learning. When embedded with adequate metacognitive support, generative AI can function as a scaffolding tool that strengthens students' learning experience and self-regulatory capacity rather than eroding it (Xu et al., 2025). Similarly, digital multitasking that is task-relevant and goal-directed has been shown not to consistently harm, and may even support, academic performance, in contrast to task-irrelevant multitasking (Fan et al., 2025). Based on these competing perspectives, it is hypothesized that generative AI dependency and digital multitasking habits significantly influence students' self-regulated learning, either positively or negatively.

Based on the theoretical framework and prior empirical evidence, it is hypothesized that generative AI dependency and digital multitasking habits significantly influence students' self-regulated learning. Drawing on this research gap, the present study aims to analyze the influence of generative AI dependency and digital multitasking habits on students' self-regulated learning, both partially and simultaneously. The findings are intended to offer actionable insights for educational institutions in designing more adaptive learning strategies amid rapid digital transformation, while also providing an empirical foundation for digital literacy policies that encourage the responsible use of AI without compromising students' capacity for independent learning.

Research Method

This study employed a quantitative approach with a regression design to examine the influence of generative AI dependency and digital multitasking habits on students' self-regulated learning (SRL). This approach was selected for its capacity to describe relationships between variables without administering any treatment to respondents. The estimated total population of active students across the five study programs at Universitas Pendidikan Indonesia Purwakarta Campus during the 2023–2025 enrollment period was approximately 2,816 students. From this population, a sample of 300 active students was drawn through purposive sampling, with the inclusion criterion that students must have used a generative AI platform such as ChatGPT, Claude, Copilot, or equivalent tools at least once for academic purposes. This sample size exceeds the minimum requirement for multiple regression analysis with two predictors ($n \geq 50 + 8m$; Green, 1991, as cited in Seabrook, (2025) and corresponds to a margin of error of approximately 5.46% relative to the total population, which is within the commonly accepted range for social and educational research, with the inclusion criterion that students must have used a generative AI platform such as ChatGPT, Claude, Copilot, or equivalent tools at least once for academic purposes. In terms of program distribution, the largest group came from the Information System and Technology Education 94 students (31,3%), followed by Telecommunications Systems 61 students (20.3%), Primary School Teacher Education 53 students (17.7%), Early Childhood Teacher Education 50 students (16.7%), and Mechatronics and Artificial Intelligence 42 students (14%). By year of study, sixth-semester students formed the largest cohort 108 students (36%), followed by fourth-semester 105 students (35%), and second-semester 87 students (29%). By gender,



female respondents accounted for 198 students (66%) and male respondents for 102 students (34%).

The study involved two independent variables and one dependent variable. The first independent variable was generative AI dependency (X1), measuring the extent to which students rely on AI during their learning process. The second was digital multitasking habits (X2), measuring the frequency with which students use multiple digital platforms simultaneously while studying. The dependent variable was self-regulated learning (Y), capturing students' capacity to plan, monitor, and evaluate their own learning independently. Data were collected using a closed-ended questionnaire with a four-point Likert scale comprising 35 items. X1 was measured using 10 items adapted from (Wu et al., 2026), covering the dimensions of emotional dependence, functional dependence, cognitive dependence, and loss of control. X2 was measured using 9 items adapted from (Campos et al., 2025), encompassing multitasking across two media, multitasking between media and non-media activities, and concentration without multitasking. Y was measured using 16 items adapted from the Self-Regulation for Learning Online (SRL-O) instrument developed by (Broadbent et al., 2023), covering online self-efficacy, intrinsic motivation, planning and time management, metacognition, effort regulation, and task strategies.

Data collection was conducted online via Google Forms, distributed to respondents through social media channels and academic group networks. Prior to the main data collection phase, the instrument was piloted on 30 respondents to establish preliminary evidence of validity and reliability. Pilot results indicated that two items for X1 and two items from Y failed to meet the minimum corrected item-total correlation threshold of 0.3 (Nunnally & Bernstein., 1994) and were therefore removed from the final instrument. The remaining items were confirmed to satisfy the validity and reliability criteria required for the measurement of the study variables.

Data analysis was carried out using multiple linear regression to test the influence of generative AI dependency and digital multitasking habits on students' SRL. Prior to regression analysis, a series of prerequisite tests were conducted, including validity, reliability, normality, linearity, multicollinearity, and heteroscedasticity tests, to ensure the adequacy of the regression model. Hypothesis testing was performed using the t-test to assess the partial effect of each independent variable, the F-test to evaluate the simultaneous effect of both variables, and the coefficient of determination (R^2) to quantify the proportion of variance in the dependent variables explained by the independent variables. All analyses were conducted using IBM SPSS Statistics version 3, enabling the findings to be interpreted in a systematic and objective manner.

Results and Discussion

Result

The study involved 300 active students from Universitas Pendidikan Indonesia Purwakarta Campus, representing five study programs: Primary School Teacher Education, Early Childhood Teacher Education, Information Systems and Technology Education, Telecommunication Systems, and Mechatronics and Artificial Intelligence. All respondents met the purposive sampling criterion of having used a generative AI platform at least once for academic purposes. A descriptive overview of the scores for each research variable is presented in Table 1.



Table 1. Descriptive Statistics of Research Variables (N = 300)

Variable	Mean	Std. Dev	Min	Max
X1 (AI Dependency)	2.87	0.52	1.10	4.00
X2 (Digital Multitasking)	2.74	0.48	1.33	4.00
Y (SRL)	2.98	0.45	1.38	3.88

As shown in Table 1, the SRL variable (Y) yielded the highest mean score of 2.98, followed by AI dependency (X1) at 2.87 and digital multitasking (X2) at 2.74. Based on the four-point Likert scale interval categorization (1.00-1.75 = very low; 1.76-2.50 = low; 2.51-3.25 = moderate; 3.26-4.00 = high), all three variables fall within the moderate category. This indicates that students demonstrated moderate levels of AI dependency, digital multitasking habits, and SRL quality. To provide a more detailed picture of students' self-regulated learning, a dimensional-level descriptive analysis was also conducted. The mean and standard deviation for each SRL dimension are presented in Table 2.

Table 2. Descriptive Statistics of SRL Dimensions (N = 300)

Dimension	Mean	Std. Dev	Min	Max
Online Self-Efficacy	3.08	0.56	1.25	4.00
Intrinsic Motivation	3.21	0.51	1.50	4.00
Planning and Time Management	2.87	0.58	1.25	4.00
Metacognition	2.76	0.57	1.25	4.00
Effort Regulation	2.61	0.63	1.00	4.00
Task Strategies	2.84	0.55	1.25	4.00

As shown in Table 2, dimensions rooted in self-perception, intrinsic motivation and online self-efficacy, yielded the highest mean scores among all SRL dimensions, while effort regulation and metacognition yielded the lowest. Before proceeding to the main analysis, the research instrument was subjected to quality testing. Validity testing confirmed that all items met the required threshold, with Corrected Item-Total Correlation values exceeding 0.3. Reliability testing yielded Cronbach's Alpha values of 0.818 for X1, 0.752 for X2, and 0.827 for Y, all above the minimum acceptable threshold of 0.70, indicating that the instrument was reliable and suitable for use.

Following instrument validation, classical assumption tests were conducted to verify the adequacy of the regression model. The Kolmogorov-Smirnov normality test applied to the unstandardized residuals produced a significance value of 0.076, exceeding the 0.05 threshold and confirming that the residuals were normally distributed. Linearity testing returned Deviation from Linearity values of 0.231 for the Y-X1 relationship and 0.198 for the Y-X2 relationship, both above 0.05, indicating that the relationships between variables were linear. Multicollinearity testing produced Tolerance values of 0.680 and VIF values of 1.471 for both independent variables, confirming the absence of multicollinearity. The Glejser heteroscedasticity test yielded significance values of 0.287 for X1 and 0.341 for X2, both exceeding 0.05, indicating homogeneous residual variance. With all classical assumptions satisfied, the regression model was deemed appropriate for hypothesis testing. The results of the multiple linear regression analysis are presented in Table 2.

Table 3. Multiple Linear Regression Analysis Results

Variable	B	Std. Error	Standardized Beta	t	Sig.
(Constant)	1.624	0.164	—	9.902	<0.001
X1 (AI Dependency)	0.213	0.053	0.246	4.019	0.004
X2 (Digital Multitasking)	0.178	0.055	0.190	3.236	0.009

R = 0.398; R² = 0.158; Adjusted R² = 0.153; F = 27.843; Sig. = <0.001



Based on Table 2, the resulting regression equation is $Y = 1.624 + 0.213X_1 + 0.178X_2$. The constant value of 1.624 indicates that when both X_1 and X_2 equal zero, students' SRL quality remains at that baseline level. The regression coefficient for X_1 (0.213) indicates that each one-unit increase in generative AI dependency is associated with a 0.213-unit increase in SRL quality, with a significance value of $0.004 < 0.05$. Similarly, the regression coefficient for X_2 (0.178) indicates that each one-unit increase in digital multitasking habits is associated with a 0.178-unit increase in SRL quality, with a significance value of $0.009 < 0.05$. Both independent variables thus demonstrated a positive and significant partial effect on students' SRL. Based on the standardized beta coefficients, X_1 (AI Dependency) demonstrated a relatively stronger influence on students' SRL ($\beta = 0.246$) compared to X_2 (digital multitasking) ($\beta = 0.190$), indicating that generative AI dependency is the more dominant predictor between the two. The F-test yielded a value of 27.843 with a significance level of < 0.001 , confirming that generative AI dependency and digital multitasking habits jointly exert a significant simultaneous effect on students' SRL. The R^2 value of 0.158 indicates that the two independent variables together account for 15.8% of the variance in students' SRL quality, with the remaining 84.2% attributable to other factors outside the model.

Discussion

This study found that generative AI dependency and digital multitasking habits exert a positive and significant influence on the self-regulated learning (SRL) of students at Universitas Pendidikan Indonesia Purwakarta Campus, both partially and simultaneously. Statistically, this is evidenced by t-test significance values of 0.004 for X_1 and 0.009 for X_2 , along with an F-value of 27.843 with a significance level of < 0.001 in the initial hypothesis predicting negative effects, as reported in a number of prior studies (Costanzo, 2024; Georgiou, 2025; Parry & Le Roux, 2021; Suryanto et al., 2025). Rather than undermining the analysis, this unexpected finding opens a richer conversation about how digitally native students navigate technology within learning processes.

The positive influence of generative AI dependency on SRL can be understood by examining how students actually engage with these tools. Not all forms of AI use reflect a dependency that weakens self-regulatory capacity. Many students employ AI strategically as a tool for planning their study sessions, organizing course material or clarifying concepts they find difficult to grasp. This type of purposeful use supports the planning and time management and task strategies dimensions of SRL (Xu et al., 2025). In this sense, AI can function as cognitive scaffolding that facilitates, rather than replaces, students' self-regulatory processes (Liu, 2026). (Budiani et al., 2020) found that students with higher levels of self-efficacy tend to use AI in a more autonomous and independent manner, such that dependency does not automatically undermine self-directed learning instead the two can coexist. (Lund et al., 2025) similarly found that students exercise critical awareness when using AI for academic purposes, particularly regarding plagiarism risks, with the majority viewing AI-generated paper writing as a serious form of academic misconduct. (Xia et al., 2024) further note that generative AI carries broad pedagogical potential, not simply as a technical aid but as a medium for transforming assessment and fostering self-regulated learning in higher education.

A similar pattern emerges with digital multitasking habits. Students who are accustomed to using multiple digital platform simultaneously appear to have developed a degree of cognitive flexibility that enables them to sustain self-directed learning even in distraction-heavy environments (Nakhostin-Khayyat et al., 2024). (Deng et al., 2024) also



established that the relationship between digital multitasking and learning is not straightforward, as motivational factors and self-regulatory strategies prove more determinative of learning quality than multitasking behavior per se. Within this context, the reasonably adequate SRL levels observed among Universitas Pendidikan Indonesia Purwakarta Campus students likely function as a buffer that mitigates the negative effects of digital multitasking, which would explain why both variables appear to trend positively alongside one another. (Guntur & Purnomo, 2024) further found that self-regulated learning plays a critical role in the success and adaptability of learners across varied digital learning conditions, affirming that students with strong self-regulatory capacities are better prepared to deal with distractions and sustain their learning strategies even in distraction-rich digital environments.

That said, these findings warrant careful interpretation, as the dimensional-level descriptive analysis presented in Table 1b reveals a more complex and layered picture. Dimensions rooted in self-perception, intrinsic motivation ($M = 3.21$) and online self-efficacy ($M = 3.08$), yielded the highest mean scores across all SRL dimensions. In contrast, dimensions reflecting more concrete cognitive regulatory behavior were notably lower, including effort regulation ($M = 2.61$), metacognition ($M = 2.76$), and planning and time management ($M = 2.87$), while task strategies ($M = 2.84$) fell in between. This suggests that while students feel motivated and academically confident, their capacity to sustain effort, monitor their own thinking, and plan their learning concretely remains comparatively weaker. This pattern is consistent with concerns about metacognitive laziness, a condition in which students feel capable and motivated precisely because AI is supporting them, yet unknowingly reduce their own active metacognitive engagement in the process. The result is an illusion of competence that does not fully reflect genuine self-regulatory ability. Parry & Le Roux, (2021) similarly caution that the effect of digital technology on cognition are often inconsistent and highly dependent on how the technology is used, not merely how frequently.

Zimmerman, (2002) framework helps illuminate this pattern more deeply. SRL is conceptualized as an interconnected three phase cycle comprising forethought, performance, and self-reflection. The high scores on intrinsic motivation and online self-efficacy suggest that students' forethought phase is relatively strong, they enter learning situations with adequate goal orientation and self-belief. However, the weaknesses observed in metacognition and effort regulation point to gaps in the performance and self-reflection phases, where students are not yet optimally monitoring and evaluating their own learning in an active and ongoing way. This underscores the importance of external metacognitive support, including the guided use of technology, in bridging the gaps between SRL phases (Xu et al., 2025). These findings align with the argument that AI designed to prompt reflection and critical questioning can strengthen SRL, whereas passively used AI that demands little cognitive engagement risks eroding students' metacognitive capacities over time.

The coefficient of determination of 0.158 indicates that generative AI dependency and digital multitasking together account for only 15.8% of the variance in students' SRL, with the remaining 84.2% attributable to factors outside the model. This affirms that SRL is a multidimensional and complex construct that cannot be adequately explained by two technological variables alone. (Luo & Zhou, 2024), in their systematic review, found that SRL in blended learning environments is shaped by a constellation of factors simultaneously, including instructional design, pedagogical support, learning styles, and individual student characteristics. Factors external to the model such as academic workload, individually



varying intrinsic motivation, the quality of faculty interaction, and students' socioeconomic conditions are likely to exert a more dominant influence on SRL quality than the technological variables examined here. This finding also aligns with a broader body of literature emphasizing that the impact of educational technology, including generative AI, is not uniform and is deeply contingent on institutional context and user characteristics (Khalida et al., 2025; Sibuea et al., 2022).

Taken together, this study offers a rich empirical portrait of the relationships between generative AI use, digital multitasking habits, and SRL in the context of Indonesian higher education. The fact that findings did not align neatly initial hypotheses opens a broader space for discussion about how digitally native students integrate technology into their self-regulatory learning processes. The influence of technology on SRL is evidently neither simple nor linear, it is deeply shaped by patterns of use, institutional context, and individual student characteristics (Rodríguez-Ruiz et al., 2025). Accordingly, pedagogical interventions aimed at strengthening SRL in the age of AI need to go beyond simply restricting or passively facilitating access to generative tools. What is needed is a deliberate emphasis on building critical technology literacy alongside concrete metacognitive competencies.

Conclusion

This study successfully addressed its primary objective of examining the influence of generative AI dependency and digital multitasking habits on the self-regulated learning (SRL) of students at Universitas Pendidikan Indonesia Purwakarta Campus. Contrary to the initial hypothesis, both generative AI dependency and digital multitasking habits were found to exert a positive influence on students' SRL, reflecting the complexity of the relationship between technology use and learning regulation among digitally native students. This finding suggests that, at the levels of use observed among participants, engagement with generative AI and digital multitasking has not reached a threshold at which it meaningfully undermines students' capacity for self-regulation; rather, when used purposefully, these forms of digital engagement may function as a resource that students actively draw upon in managing their learning process. At the same time, the dimensional analysis points to an important nuance: while students exhibit strong self-efficacy and intrinsic motivation, their capacity for effort regulation and metacognitive monitoring remains comparatively underdeveloped. This pattern carries theoretical implications for how SRL is conceptualized within AI-mediated learning environments, suggesting that existing frameworks may need to more explicitly account for the scaffolding role generative AI can play across different phases of the self-regulatory cycle. From a policy standpoint, these findings imply that higher education institutions need not adopt a restrictive stance toward generative AI, but should instead focus on cultivating students' critical and reflective engagement with such tools, alongside deliberate efforts to strengthen the more concrete regulatory competencies, such as effort management and metacognitive monitoring that this study found to be comparatively weaker.

Recommendation

Given the finding that generative AI dependency and digital multitasking do not inherently undermine SRL when used purposefully, higher education institutions and instructors are encouraged to move away from restrictive policies toward generative AI and instead focus on cultivating students' critical and reflective use of such tools. Specifically, instructors can design learning tasks that require students to justify, evaluate, or refine AI-generated output, thereby reinforcing metacognitive engagement rather than passive reliance.



Given that effort regulation and metacognitive monitoring emerged as comparatively weaker dimensions of SRL, institutions may also consider integrating structured self-monitoring activities, such as learning journals, goal-setting checkpoints, or reflective prompts into course design to strengthen these specific regulatory competencies. For students, cultivating awareness of how and when digital multitasking supports versus hinders their own learning process may help them use these habits more intentionally rather than by default.

In terms of future research directions, more in-depth methodological approaches are encouraged to more comprehensively uncover the mechanisms underlying the relationship between AI use, digital multitasking, and SRL. Longitudinal measurement designs would allow researchers to track changes in students' self-regulatory capacity over time as their AI dependency and multitasking habits evolve, providing a more dynamic picture than the cross-sectional snapshot offered by the present study. A mixed-methods approach that combines questionnaire data with real behavioural data, such as screen time logs or learning analytics, would also strengthen the validity of findings by moving beyond self-report limitations. Incorporating moderating or mediating variables such as digital literacy, learning styles, academic workload, or the quality of pedagogical interaction would further help explain a greater proportion of the variance in SRL outcomes, given that the two variables in this study accounted for only 15.8% of the total variance. Future studies are also encouraged to expand the research context beyond a single campus to include more diverse institutional settings, enabling broader generalization of findings across different higher education environments in Indonesia and beyond.

References

- Abbi, A., Skouri, M., & Raoufi, M. (2026). Generative AI in Higher Education: A Leap Beyond Chatbots Toward Personalized Learning. In Y. Mejdoub, A. Elamri, & M. Kardouchi (Eds.), *Connected Objects, Artificial Intelligence, Telecommunications and Electronics Engineering* (Vol. 1584, pp. 371–376). Springer Nature Switzerland. https://doi.org/10.1007/978-3-032-01536-5_57
- Achruh, A., Rapi, M., Rusdi, M., & Idris, R. (2024). Challenges and Opportunities of Artificial Intelligence Adoption in Islamic Education in Indonesian Higher Education Institutions. *International Journal of Learning, Teaching and Educational Research*, 23(11), 423–443. <https://doi.org/10.26803/ijlter.23.11.22>
- Aziz, M. S., Subiakto, H., & Puspa, R. (2025). Diffusion of artificial intelligence across Indonesia: Digital disparities, local contexts, and policy implications. *Masyarakat, Kebudayaan Dan Politik*, 38(3), 276–292. <https://doi.org/10.20473/mkp.V38I32025.276-292>
- Broadbent, J., Panadero, E., Lodge, J. M., & Fuller-Tyszkiewicz, M. (2023). The self-regulation for learning online (SRL-O) questionnaire. *Metacognition and Learning*, 18(1), 135–163. <https://doi.org/10.1007/s11409-022-09319-6>
- Budiani, M. S., Mulyana, O. P., & Puspitadewi, N. W. S. (2020). Peran Kepercayaan Diri dan Kemampuan Multitasking terhadap Readiness to Change pada Mahasiswa. *Jurnal Psikologi Teori Dan Terapan*, 10(2), 150. <https://doi.org/10.26740/jptt.v10n2.p150-162>
- Campos, L., Nobre, B., Morais, C., Veríssimo, L., Dias, P., & Luo, J. (2025). Media Multitasking Scale: Validation Study with Portuguese Adolescents. *Social Sciences*, 14(3), 187. <https://doi.org/10.3390/socsci14030187>



- Costanzo, T. (2024). *Digital Multitasking Among Youth: Effects on Cognitive Function and Academic Performance*. PsyArXiv. https://doi.org/10.31234/osf.io/jzphn_v1
- Deng, L., Zhou, Y., & Broadbent, J. (2024). Distraction, multitasking and self-regulation inside university classroom. *Education and Information Technologies*, 29(18), 23957–23979. <https://doi.org/10.1007/s10639-024-12786-w>
- Fan, L., Pan, C., Bai, X., & Li, S. (2025). The impact of relevant versus irrelevant media multitasking on academic performance during online learning: A serial of mediating models. *Frontiers in Psychiatry*, 16, 1599827. <https://doi.org/10.3389/fpsy.2025.1599827>
- Fathony, M. H., Hizraini, A. A., Aulia, R., & Almaisarah, A. (2024). Persepsi mahasiswa terhadap penggunaan ChatGPT di Universitas Nahdlatul Ulama Kalimantan Selatan. *Jurnal Review Pendidikan dan Pengajaran*, 7(4), 16601–16607.
- Firdaus, J. A., Ummah, R. I., Aprialini, R. R., Fithriyyah, A., Mahsusi, M., & Faizin, A. (2025). Ketergantungan penggunaan kecerdasan buatan (AI) pada tugas akademik mahasiswa terhadap kemampuan berpikir kritis dan kreatif. *Didaktika: Jurnal Kependidikan*, 14(1), 1203–1214
- Georgiou, G. P. (2025). *ChatGPT produces more “lazy” thinkers: Evidence of cognitive engagement decline* (Version 1). arXiv. <https://doi.org/10.48550/ARXIV.2507.00181>
- Guntur, M., & Purnomo, Y. W. (2024). A Meta-Analysis of Self-Regulated Learning Interventions Studies on Learning Outcomes in Online and Blended Environments. *Online Learning*, 28(3). <https://doi.org/10.24059/olj.v28i3.4025>
- Khalida, R., Rahmandri, A., Matilda Magren, S. A., & Nurmiati, E. (2025). Etika Teknologi Informasi dalam Dunia Pendidikan: Tinjauan Literatur atas Penggunaan AI dan Isu Plagiarisme Akademik. *Jurnal SAINTEKOM*, 15(2), 222–234. <https://doi.org/10.33020/saintekom.v15i2.928>
- Liu, B. (2026). How Does Self-Regulated Learning Resist AI Dependence? A Mediating Effect Study Based on College Students Who Frequently Use AIGC Tools. *Sage Open*, 16(1), 21582440261420068. <https://doi.org/10.1177/21582440261420068>
- Lund, B. D., Lee, T. H., Mannuru, N. R., & Arutla, N. (2025). AI and Academic Integrity: Exploring Student Perceptions and Implications for Higher Education. *Journal of Academic Ethics*, 23(3), 1545–1565. <https://doi.org/10.1007/s10805-025-09613-3>
- Luo, R., & Zhou, Y. (2024). The effectiveness of self-regulated learning strategies in higher education blended learning: A five years systematic review. *Journal of Computer Assisted Learning*, 40(6), 3005–3029. <https://doi.org/10.1111/jcal.13052>
- Nakhostin-Khayyat, M., Borjali, M., Zeinali, M., Fardi, D., & Montazeri, A. (2024). The relationship between self-regulation, cognitive flexibility, and resilience among students: A structural equation modeling. *BMC Psychology*, 12(1), 337. <https://doi.org/10.1186/s40359-024-01843-1>
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.
- Parry, D. A., & Le Roux, D. B. (2021). “Cognitive control in media multitaskers” ten years on: A meta-analysis. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 15(2). <https://doi.org/10.5817/CP2021-2-7>
- Rodríguez-Ruiz, J., Marín-López, I., & Espejo-Siles, R. (2025). Is artificial intelligence use related to self-control, self-esteem and self-efficacy among university students? *Education and Information Technologies*, 30(2), 2507–2524. <https://doi.org/10.1007/s10639-024-12906-6>



- Seabrook, J. A. (2025). Powering Nutrition Research: Practical Strategies for Sample Size in Multiple Regression. *Nutrients*, 17(16), 2668. <https://doi.org/10.3390/nu17162668>
- Sibuea, M. F. L., Sembiring, M. A., Agus, R. T. A., & Pertiwi, D. (2022). Pengaruh Kemandirian Belajar (Self Regulated Learning) Terhadap Hasil Belajar Mahasiswa Pada Mata Kuliah Logika Komputer. *JOURNAL OF SCIENCE AND SOCIAL RESEARCH*, 5(3), 715. <https://doi.org/10.54314/jssr.v5i3.1205>
- Suryanto, A. F., Wajdi, M., Sahoo, P. K., Wu, Q., Yusof, N. M., & Chan, Y. F. (2025). The impact of artificial intelligence on logic skills, critical thinking, and student creativity. *Journal of Language, Literature, Social and Cultural Studies*, 3(3), 283–299. <https://doi.org/10.58881/jllscs.v3i3.407>
- Suryawijaya, M. R., Praptodiyono, S., & A'kaasyah, S. N. (2025). Peran Kecerdasan Buatan dalam Mengembangkan Kompetensi dan Meningkatkan Motivasi Belajar Mahasiswa. *Informatik : Jurnal Ilmu Komputer*, 21(2), 155–165. <https://doi.org/10.52958/iftk.v21i2.11115>
- Ulfah, M. (2024). Dampak ketergantungan pada artificial intelligence terhadap kemampuan analitis dan kreatif mahasiswa. *VOX Edukasi: Jurnal Ilmiah Ilmu Pendidikan*, 15(1), 120–130.
- Wu, H., Ni, H., Luo, W., & Wu, T. (2026). Development and validation of the AI dependence scale for Chinese undergraduates and a preliminary exploration. *Frontiers in Psychology*, 16, 1725393. <https://doi.org/10.3389/fpsyg.2025.1725393>
- Xia, Q., Weng, X., Ouyang, F., Lin, T. J., & Chiu, T. K. F. (2024). A scoping review on how generative artificial intelligence transforms assessment in higher education. *International Journal of Educational Technology in Higher Education*, 21(1), 40. <https://doi.org/10.1186/s41239-024-00468-z>
- Xu, X., Qiao, L., Cheng, N., Liu, H., & Zhao, W. (2025). Enhancing self-regulated learning and learning experience in generative AI environments: The critical role of metacognitive support. *British Journal of Educational Technology*, 56(5), 1842–1863. <https://doi.org/10.1111/bjet.13599>
- Zhang, S., Zhao, X., Zhou, T., & Kim, J. H. (2024). Do you have AI dependency? The roles of academic self-efficacy, academic stress, and performance expectations on problematic AI usage behavior. *International Journal of Educational Technology in Higher Education*, 21(1), 34. <https://doi.org/10.1186/s41239-024-00467-0>
- Zimmerman, B. J. (2002). Becoming a Self-Regulated Learner: An Overview. *Theory Into Practice*, 41(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2