Mediterranean Journal of Basic and Applied Sciences (MJBAS)
Volume 10, Issue 2, Pages 284-295, April-June 2026

Perceived Usefulness of Technology and Self-Regulated Learning Among Criminology Students in Digital Learning Environments: Examining the Mediating Role of Digital Academic Self-Efficacy in Enhancing Academic Engagement and Learning Performance

Mark Christian O. Bongcac[1] & Teopisto Y. Culanag Jr.[2*]

[1]College of Criminal Justice Education, La Salle University, Valconcha Street, Brgy. Aguada, Ozamiz City, Misamis Occidental 7200, Philippines. [2]Graduate School, Misamis University, H.T. Feliciano St., Aguada, Ozamiz City, Misamis Occidental 7200, Philippines.
Corresponding Author (Teopisto Y. Culanag Jr.) Email: teopistoculanag1979@gmail.com[*]

DOI: Under Assignment

Article Received: 14 March 2026 *Article Accepted: 18 May 2026* *Article Published: 24 May 2026*

ABSTRACT

The integration of digital technologies in criminology education has transformed students' learning experiences and academic engagement. This study examined the levels and relationships among perceived usefulness, digital academic self-efficacy, and self-regulated learning among criminology students in one higher educational institution in Misamis Occidental. The study employed a quantitative descriptive-correlational research design involving 135 criminology students selected through stratified sampling. Standardized and adapted survey questionnaires were utilized to measure the variables. Data were analyzed using mean, standard deviation, Pearson Product-Moment Correlation, multiple regression, and mediation analysis. Findings revealed that criminology students demonstrated very high levels of perceived usefulness and digital academic self-efficacy, as well as high levels of self-regulated learning. Significant relationships were identified among the variables, indicating that students who perceived digital technologies as useful and possessed strong digital self-efficacy also demonstrated stronger self-regulated learning behaviors. The findings suggest that strengthening students' confidence and competence in digital learning environments may enhance autonomous learning and academic engagement. The study contributes to the growing body of literature on technology-enhanced criminology education and provides implications for instructional improvement and digital learning support.

Keywords: Academic Performance; Criminology Students; Digital Academic; Self-Efficacy; Digital Learning; Educational Technology; Higher Education; Learning Motivation; Online Learning Environments; Perceived Usefulness; Self-Regulated Learning; Student Engagement; Technology Acceptance Model.

1.0. Introduction

The integration of digital technologies in higher education has substantially transformed instructional delivery, academic engagement, and students' learning experiences across disciplines, including criminology education. As learning management systems, online platforms, virtual simulations, and digital academic resources become increasingly embedded in classroom instruction, students are expected to adapt to technology-enhanced learning environments that support both academic performance and professional preparation (Graham et al., 2023; Ibrahim and Al-dawsari, 2023). In criminology education, digital technologies facilitate online legal research, crime mapping, forensic simulations, collaborative learning, and access to real-time criminal justice information, thereby improving the flexibility, efficiency, and accessibility of instruction (Ergasheva et al., 2025; Yankson et al., 2025). These developments underscore the growing importance of understanding how criminology students engage with and respond to technology-supported learning.

Within digital learning environments, three constructs have emerged as particularly important in shaping students' academic engagement and learning behaviors: perceived usefulness, digital academic self-efficacy, and self-regulated learning. Perceived usefulness refers to students' belief that digital technologies enhance their academic performance and learning efficiency (López-Sánchez et al., 2024; Navarro et al., 2023). Digital academic self-efficacy pertains to students' confidence in their ability to use digital tools effectively to complete academic tasks (Zakir et al., 2025). Self-regulated learning, in turn, reflects students' capacity to plan, monitor, and evaluate

their learning through goal setting, time management, and strategic learning behaviors (Panadero, 2022; Xu et al., 2023). Together, these constructs are highly relevant to criminology education, where students increasingly engage in technology-supported coursework, digital investigations, and online academic requirements that demand both technical competence and autonomous learning.

Although prior studies have explored technology use, academic self-efficacy, and self-regulated learning in general education and other academic disciplines, limited research has examined these variables specifically among criminology students, particularly within the Philippine higher education context. Existing literature largely focuses on broader student populations, with minimal attention to how criminology students perceive digital technologies, develop confidence in technology-supported learning, and regulate their academic behaviors in digital learning environments. Moreover, the unique instructional demands of criminology education, including legal research, forensic analysis, and investigative simulations, warrant focused investigation into students' digital learning experiences (Hutchison et al., 2026; Choi-Lundberg et al., 2023; Timotheou et al., 2023). This gap in the literature highlights the need to examine the relationships among perceived usefulness, digital academic self-efficacy, and self-regulated learning among criminology students.

The present study was grounded in four complementary theoretical perspectives: the Technology Acceptance Model (Davis, 1989), Social Cognitive Theory (Bandura, 1986), Self-Regulated Learning Theory (Zimmerman, 2000), and Cognitive Evaluation Theory (Deci and Ryan, 1985). The Technology Acceptance Model explains how perceived usefulness influences students' acceptance and continued use of digital technologies. Social Cognitive Theory emphasizes the role of self-efficacy beliefs in shaping learning behaviors and engagement. Self-Regulated Learning Theory highlights learners' ability to plan, monitor, and evaluate their academic activities independently. Cognitive Evaluation Theory explains how competence and autonomy support intrinsic motivation and sustained engagement in learning.

1.1. Study Objectives

This study aimed to examine the relationships among perceived usefulness of technology, digital academic self-efficacy, and self-regulated learning among criminology students in a digital learning environment. Specifically, the study sought to:

1) Determine the level of perceived usefulness of technology among criminology students in terms of efficiency in learning tasks, effectiveness in comprehension, and improvement in academic outcomes.

2) Assess the level of digital academic self-efficacy among criminology students in terms of technical confidence, problem-solving skills, and adaptability to digital learning.

3) Evaluate the level of self-regulated learning among criminology students in terms of goal setting, self-monitoring, time management, and strategic learning.

4) Examine the significant relationship between perceived usefulness of technology and digital academic self-efficacy among criminology students.

5) Determine the significant relationship between perceived usefulness of technology and self-regulated learning among criminology students.

6) Analyse the significant relationship between digital academic self-efficacy and self-regulated learning among criminology students.

2.0. Literature Review

Recent studies consistently demonstrate that perceived usefulness of technology plays a significant role in shaping students' academic engagement and learning behaviors. When students believe that digital tools enhance efficiency, comprehension, and academic outcomes, they are more likely to adopt and consistently use these technologies in their coursework (Navarro et al., 2023; López-Sánchez et al., 2024). Goh, (2025) reported that students who perceived online learning systems as useful exhibited stronger motivation, greater persistence, and more sustained participation in academic activities. Similarly, Lin and Yu (2023) found that perceived usefulness positively predicted students' intention to adopt educational technologies and their willingness to invest effort in technology-supported learning. These findings suggest that students' cognitive evaluations of the value of digital technologies serve as a critical foundation for effective learning engagement.

Digital academic self-efficacy has also emerged as an important factor influencing students' confidence and adaptability in technology-enhanced learning environments. Students who believe in their ability to use learning management systems, online research tools, and other educational technologies are more likely to persist when encountering technical challenges and to engage independently in academic tasks (Li and Zhao, 2021; Javier-Aliaga et al., 2024). Getenet et al. (2024) found that higher levels of digital self-efficacy were associated with stronger online learning engagement and more effective use of digital resources. Likewise, Ibrahim and Al-dawsari (2023) demonstrated that students with greater confidence in their digital capabilities were better able to manage coursework requirements and maintain consistent academic performance. These studies underscore the importance of strengthening students' digital confidence to promote successful participation in technology-enhanced education.

Self-regulated learning is widely recognized as a key mechanism through which students translate motivation and confidence into effective academic behaviors. Learners who actively set goals, monitor their progress, manage their time, and apply strategic learning techniques tend to demonstrate higher levels of academic achievement and greater adaptability in digital learning contexts (Panadero, 2022; Xu et al., 2023). Jansen et al. (2021) emphasized that self-regulated learning enables students to assume greater responsibility for their academic progress, particularly in environments that require independent study and reduced direct supervision. Cheng et al. (2025) further reported that students with stronger self-regulation skills were more capable of maintaining motivation and adjusting learning strategies when confronted with complex technology-based tasks. These findings indicate that self-regulated learning is essential for maximizing the educational benefits of digital technologies and sustaining academic success.

The literature suggests that perceived usefulness, digital academic self-efficacy, and self-regulated learning are conceptually and empirically interconnected. Students who perceive digital technologies as beneficial are more

likely to develop confidence in their ability to use those tools effectively, and this confidence supports the strategic learning behaviors necessary for academic success (Getenet et al., 2024; Panadero, 2022; Xu et al., 2023). However, despite growing evidence in other educational contexts, limited empirical studies have investigated these relationships among criminology students. This study addresses this gap by examining how students' perceptions of technology and confidence in digital learning relate to their self-regulated learning behaviors within the context of criminology education.

Based on the reviewed literature and theoretical foundations, Figure 1 presents the conceptual framework of the study. The framework illustrates the hypothesized relationships among perceived usefulness of technology, digital academic self-efficacy, and self-regulated learning among criminology students in digital learning environments.

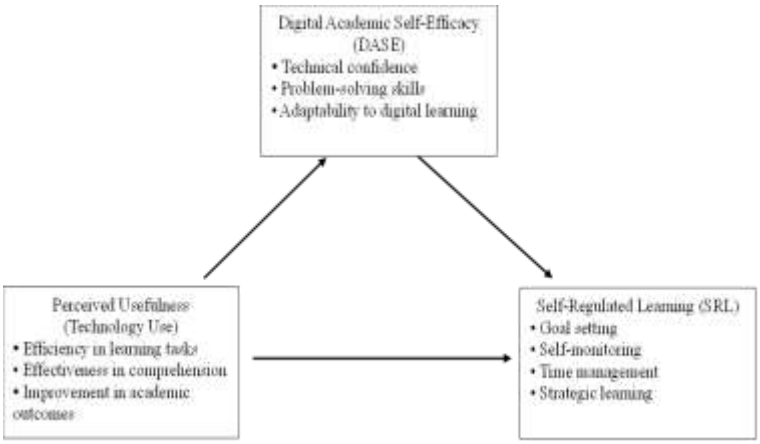

Figure 1. Conceptual Framework Illustrating the Hypothesized Relationships Among Perceived Usefulness of Technology, Digital Academic Self-Efficacy, and Self-Regulated Learning Among Criminology Students in Digital Learning Environments.

3.0. Methodology

This study employed a quantitative descriptive-correlational research design to examine the relationships among perceived usefulness, digital academic self-efficacy, and self-regulated learning among criminology students. The respondents consisted of 135 criminology students enrolled in one higher educational institution in Misamis Occidental during the School Year 2025–2026. Stratified sampling was employed to ensure proportional representation across year levels. The study utilized adapted and validated questionnaires measuring perceived usefulness, digital academic self-efficacy, and self-regulated learning. Reliability testing yielded Cronbach's alpha values ranging from 0.90 to 0.95, indicating high internal consistency. Mean and standard deviation were used to determine variable levels, while Pearson Product-Moment Correlation, multiple regression, and mediation analysis were utilized to examine relationships among variables.

4.0. Results and Discussion

4.1. Presents the Mean Scores, Standard Deviations, and Descriptive Interpretations of Criminology Students' Perceived Usefulness of Technology Across Efficiency in Learning Tasks, Effectiveness in Comprehension, and Improvement in Academic Outcomes

Table 1 presents the level of perceived usefulness of digital learning tools among criminology students in terms of efficiency in learning tasks, effectiveness in comprehension, and improvement in academic outcomes.

The findings revealed that criminology students demonstrated a very high level of perceived usefulness of digital learning tools. Among the indicators, efficiency in learning tasks obtained the highest mean, suggesting that students perceive technology as highly beneficial in organizing academic activities, accessing learning materials, and completing academic requirements efficiently. This indicates that digital learning platforms contribute positively to students' academic productivity and engagement in criminology education.

The findings support the Technology Acceptance Model of Davis (1989), which explains that students are more likely to engage with digital technologies when these tools are perceived as useful in improving academic performance. The results further imply that digital technologies facilitate more effective learning experiences, particularly in criminology courses involving legal research, case analysis, and technology-supported instruction. Similar findings were reported by Xu et al. (2023) and Graham et al. (2023), who found that perceived usefulness significantly influences students' engagement and sustained use of educational technologies.

Table 1. Presents the Mean Scores, Standard Deviations, and Descriptive Interpretations of Criminology Students' Perceived Usefulness of Technology Across Efficiency in Learning Tasks, Effectiveness in Comprehension, and Improvement in Academic Outcomes.

Indicators	Mean	SD	Interpretation
Efficiency in Learning Tasks	4.48	0.566	Very High
Effectiveness in Comprehension	4.35	0.590	Very High
Improvement in Academic Outcomes	4.34	0.557	Very High
Overall	4.39	0.571	Very High

4.2. Presents the Mean Scores, Standard Deviations, and Descriptive Interpretations of Criminology Students' Digital Academic Self-Efficacy in Terms of Technical Confidence, Problem-Solving Skills, and Adaptability to Digital Learning

Table 2 presents the level of digital academic self-efficacy among criminology students in terms of technical confidence, problem-solving skills, and adaptability to digital learning.

The findings showed that criminology students demonstrated a very high level of digital academic self-efficacy, indicating strong confidence in their ability to utilize digital technologies for academic purposes. Technical confidence obtained the highest mean, suggesting that students are comfortable navigating learning management systems, conducting online research, and utilizing technology-enhanced learning tools. This implies that students possess the technological competence necessary to function effectively in digital learning environments.

The findings support Bandura's (1986) Social Cognitive Theory, which explains that individuals' confidence in their capabilities significantly influences their learning behaviors and engagement. Students with strong digital

academic self-efficacy are more likely to persist in accomplishing technology-supported academic tasks and adapt effectively to digital learning demands. The findings are consistent with the studies of Getenet et al. (2024) and Javier-Aliaga et al. (2024), which emphasized that students with stronger digital confidence demonstrate higher engagement and adaptability in online learning environments.

Table 2. Presents the Mean Scores, Standard Deviations, and Descriptive Interpretations of Criminology Students' Digital Academic Self-Efficacy in Terms of Technical Confidence, Problem-Solving Skills, and Adaptability to Digital Learning.

Indicators	Mean	SD	Interpretation
Technical Confidence	4.41	0.581	Very High
Problem-Solving Skills	4.33	0.602	Very High
Adaptability to Digital Learning	4.37	0.575	Very High
Overall	4.37	0.586	Very High

4.3. Presents the Mean Scores, Standard Deviations, and Descriptive Interpretations of Criminology Students' Self-Regulated Learning in Terms of Goal Setting, Self-Monitoring, Time Management, and Strategic Learning

Table 3 presents the level of self-regulated learning among criminology students in terms of goal setting, self-monitoring, time management, and strategic learning.

The findings revealed that criminology students demonstrated a very good level of self-regulated learning. Goal setting obtained the highest mean, indicating that students are capable of establishing academic goals and organizing learning activities effectively. The results suggest that students possess the ability to independently manage their academic responsibilities and adapt learning strategies to meet academic demands in digital learning environments.

The findings support Zimmerman's (2000) Self-Regulated Learning Theory, which emphasizes students' active role in planning, monitoring, and evaluating their learning behaviors. In technology-enhanced criminology education, self-regulated learning is essential because students are often required to manage independent learning activities with reduced direct supervision. The findings are supported by Panadero (2022) and Xu et al. (2023), who emphasized that students with stronger self-regulation skills demonstrate greater academic engagement and learning effectiveness in online and blended learning environments.

Table 3. Presents the Mean Scores, Standard Deviations, and Descriptive Interpretations of Criminology Students' Self-Regulated Learning in Terms of Goal Setting, Self-Monitoring, Time Management, and Strategic Learning

Indicators	Mean	SD	Interpretation
Goal Setting	4.22	0.610	Excellent
Self-Monitoring	4.18	0.592	Very Good

Time Management	4.09	0.641	Very Good
Strategic Learning	4.16	0.603	Very Good
Overall	4.16	0.612	Very Good

4.4. Presents the Pearson Product-Moment Correlation Coefficients Showing the Relationship Between Perceived Usefulness of Technology and Digital Academic Self-Efficacy Among Criminology Students

Table 4 presents the relationship between perceived usefulness and digital academic self-efficacy among criminology students.

The findings revealed a significant relationship between perceived usefulness and digital academic self-efficacy among criminology students. This suggests that students who perceive digital technologies as useful are more likely to develop stronger confidence in utilizing these technologies for academic tasks. Positive experiences with educational technologies may therefore strengthen students' technological competence and confidence in digital learning environments.

The findings support the Technology Acceptance Model and Social Cognitive Theory, which explain that students' perceptions of technology usefulness and self-beliefs influence their engagement and academic behaviors. Similar findings were reported by Lin and Yu (2023) and Getenet et al. (2024), who found that perceived usefulness significantly influences students' digital confidence and engagement in technology-supported learning.

Table 4. Presents the Pearson Product-Moment Correlation Coefficients Showing the Relationship Between Perceived Usefulness of Technology and Digital Academic Self-Efficacy Among Criminology Students.

Variables	r-value	p-value	Decision	Interpretation
Perceived Usefulness and Digital Academic Self-Efficacy	0.71	0.000	Reject Ho	Significant

4.5. Presents the Pearson Product-Moment Correlation Coefficients Showing the Relationship Between Perceived Usefulness of Technology and Self-Regulated Learning Among Criminology Students

Table 5 presents the relationship between perceived usefulness and self-regulated learning among criminology students.

The findings indicated a significant relationship between perceived usefulness and self-regulated learning among criminology students. Students who perceive digital learning tools as useful are more likely to demonstrate effective learning management behaviors such as goal setting, time management, and strategic learning. This suggests that positive perceptions regarding technology encourage students to become more responsible and autonomous learners.

The findings are consistent with Self-Regulated Learning Theory, which emphasizes that students' cognitive beliefs and motivation influence their learning behaviors. The findings support Xu et al. (2023) and Panadero (2022), who reported that positive digital learning experiences contribute to stronger self-regulated learning behaviors and academic engagement.

Table 5. Presents the Pearson Product-Moment Correlation Coefficients Showing the Relationship Between Perceived Usefulness of Technology and Self-Regulated Learning Among Criminology Students.

Variables	r-value	p-value	Decision	Interpretation
Perceived Usefulness and Self-Regulated Learning	0.68	0.000	Reject Ho	Significant

4.6. Presents the Pearson Product-Moment Correlation Coefficients Showing the Relationship Between Digital Academic Self-Efficacy and Self-Regulated Learning Among Criminology Students

Table 6 presents the relationship between digital academic self-efficacy and self-regulated learning among criminology students.

The results further revealed a significant relationship between digital academic self-efficacy and self-regulated learning among criminology students. Students who possess higher confidence in using digital technologies are more likely to demonstrate effective self-regulated learning behaviors. This indicates that technological confidence supports independent learning, persistence, and strategic academic engagement in technology-enhanced learning environments.

The findings support Social Cognitive Theory and Self-Regulated Learning Theory, which explain that self-efficacy significantly influences students' motivation, persistence, and academic regulation behaviors. Similar findings were reported by Getenet et al. (2024) and Jansen et al. (2021), who emphasized that students with stronger digital confidence tend to demonstrate higher levels of self-regulation and academic engagement in online learning settings.

Table 6. Presents the Pearson Product-Moment Correlation Coefficients Showing the Relationship Between Digital Academic Self-Efficacy and Self-Regulated Learning Among Criminology Students.

Variables	r-value	p-value	Decision	Interpretation
Digital Academic Self-Efficacy and Self-Regulated Learning	0.75	0.000	Reject Ho	Significant

5.0. Conclusion and Future Recommendations

The study concluded that criminology students demonstrated very high levels of perceived usefulness and digital academic self-efficacy, as well as a very good level of self-regulated learning in digital learning environments. The findings revealed significant positive relationships among perceived usefulness, digital academic self-efficacy, and self-regulated learning. These results indicate that students who perceive digital technologies as useful and possess strong confidence in using them are more likely to regulate their learning effectively. The study underscores the importance of strengthening technology-enhanced instruction and digital learning support to promote autonomous learning and academic success among criminology students.

Based on the findings and conclusions of the study, several recommendations are proposed to strengthen technology-enhanced learning and promote digital competence, learner confidence, and self-regulated learning among criminology students. The following recommendations may serve as practical guidance for educators, academic administrators, curriculum planners, and future researchers.

1. Criminology educators should continue integrating discipline-specific digital technologies, such as learning management systems, online legal databases, crime mapping applications, and forensic simulations, to strengthen students' perceptions of the usefulness of technology in learning.
2. Higher education institutions should provide regular digital literacy and technology skills training to enhance students' technical confidence, problem-solving abilities, and adaptability to digital learning environments.
3. Instructors are encouraged to incorporate self-regulated learning strategies including goal setting, self-monitoring, time management, and strategic learning through structured classroom activities, guided reflection, and progress-monitoring tasks.
4. Academic administrators should ensure reliable internet connectivity, updated technological infrastructure, and responsive technical support services to minimize barriers and promote effective digital learning experiences.
5. Curriculum planners should further integrate technology-enhanced and learner-centered instructional approaches that promote independent learning, critical thinking, and professional readiness among criminology students.
6. Future researchers should replicate the study in other institutions and include additional variables, such as digital literacy, academic engagement, and academic performance, to further explain self-regulated learning among criminology students.

Declarations

Source of Funding

This research did not benefit from grant from any non-profit, public or commercial funding agency.

Competing Interests Statement

The authors have declared that no competing financial, professional or personal interests exist.

Consent for publication

Both authors contributed to the manuscript and consented to the publication of this research work.

Availability of data and material

The data generated and analysed during this study consist of interview transcripts, audio recordings, and field notes. These data are not publicly available due to confidentiality and ethical restrictions but may be made available from the corresponding author upon reasonable request, subject to approval and in accordance with the Data Privacy Act of 2012 (RA 10173).

Acknowledgments

Mark Christian O. Bongcac expresses sincere gratitude to La Salle University for granting permission to conduct this study and to the participating criminology students for generously sharing their time and participation. Gratitude is also extended to Misamis University for its institutional support and to the Research Ethics Committee for ensuring the ethical conduct of this study. Special appreciation is given to all individuals who contributed to the completion of this research.

Declaration of Artificial Intelligence

The authors used ChatGPT to assist with language editing, grammar correction, formatting, and improvement of the manuscript. All research design, data analysis, interpretation, and conclusions were developed, reviewed, and verified by the authors, who assume full responsibility for the accuracy and integrity of the content.

References

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Prentice-Hall.

Cheng, Z., Zhang, Z., Xu, Q., Maeda, Y., & Gu, P. (2025). A meta-analysis addressing the relationship between self-regulated learning strategies and academic performance in online higher education. Journal of Computing in Higher Education, 37(1): 195–224.

Choi-Lundberg, D.L., Butler-Henderson, K., Harman, K., & Crawford, J. (2023). A systematic review of digital innovations in technology-enhanced learning designs in higher education. Australasian Journal of Educational Technology, 39(3): 133–162.

Culanag Jr., T.Y., & Chavez, C. (2026). A mediation test of social interaction and technology use on the relationship between motivated strategy for learning and academic performance among criminology students. European Journal of Education Studies, 12(11).

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3): 319–340. https://doi.org/10.2307/249008.

Deci, E.L., & Ryan, R.M. (1985). Cognitive evaluation theory: Perceived causality and perceived competence. In Intrinsic motivation and self-determination in human behavior, Pages 43–85, Springer.

Ergasheva, G., Khursanov, R., Bazarova, D., Altiyev, R., Tadjibaeva, A., Yusupdzhanova, G., & Madatova, Z. (2025). Integrating digital competencies into legal education: A pedagogical framework for the future. Qubahan Academic Journal, 5(2): 446–478. https://doi.org/10.48161/qaj.v5n2a1709.

Getenet, S., Cantle, R., Redmond, P., & Albion, P. (2024). Students' digital technology attitude, literacy and self-efficacy and their effect on online learning engagement. International Journal of Educational Technology in Higher Education, 21(1). https://doi.org/10.1186/s41239-023-00437-y.

Goh, T.-T. (2025). Learning management system log analytics: The role of persistence and consistency of engagement behaviour on academic success. Journal of Computers in Education, 13(1): 283–306. https://doi.org/10.1007/s40692-025-00358-x.

Graham, C.R., Danaa, G., Purevsuren, T., Martínez, A., Spricigo, C.B., Camilotti, B.M., & Batsukh, T. (2023). Digital learning transformation in higher education: International cases of university efforts to evaluate and improve blended teaching readiness. Education Sciences, 13(11): 1143.

Hutchison, A., Abzhaparova, A., & Murphy, J. (2026). Embedding digital forensics mindsets: A scaffolded teaching approach. Lecture Notes in Networks and Systems, Pages 154–169. https://doi.org/10.1007/978-3-032-15 105-6_8.

Ibrahim, R.K., & Aldawsari, A.N. (2023). Relationship between digital capabilities and academic performance: The mediating effect of self-efficacy. BMC Nursing, 22(1). https://doi.org/10.1186/s12912-023-01593-2.

Jansen, R.S., Van Leeuwen, A., Janssen, J., Jak, S., & Kester, L. (2019). Self-regulated learning partially mediates the effect of self-regulated learning interventions on achievement in higher education: A meta-analysis. Educational Research Review, 28: 100292.

Javier-Aliaga, D., Neyra, O.R.S., Calizaya-Milla, Y.E., & Saintila, J. (2024). Academic self-efficacy and digital competence in a sample of university students. Contemporary Educational Technology, 16(4): ep540.

Li, C., & Zhao, Y. (2021). Self-efficacy and technology acceptance in online learning: A meta-analysis. Educational Research Review, 33: 100390. https://doi.org/10.1016/j.edurev.2021.100390.

Lin, Y., & Yu, Z. (2023). Extending technology acceptance model to higher-education students' use of digital academic reading tools on computers. International Journal of Educational Technology in Higher Education, 20(1): 34.

López-Sánchez, J.A., Patiño-Vanegas, J.C., Valencia-Arias, A., & Rojas Coronel, A.M. (2024). Model of adoption of virtual tools by university students in the context of an emerging economy. Frontiers in Education, 9: 1167294.

Navarro, R., Vega, V., Bayona, H., Bernal, V., & Garcia, A. (2023). Relationship between technology acceptance model, self-regulation strategies, and academic self-efficacy with academic performance and perceived learning among college students during remote education. Frontiers in Psychology, 14: 1227956.

Panadero, E. (2022). A review of self-regulated learning: Six models and four directions for research. Frontiers in Psychology, 13: 840002. https://doi.org/10.3389/fpsyg.2022.840002.

Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S.V., Giannoutsou, N., Cachia, R., & Ioannou, A. (2023). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. Education and Information Technologies, 28(6): 6695–6726.

Xu, Z., Zhao, Y., Zhang, B., Liew, J., & Kogut, A. (2023). A meta-analysis of the efficacy of self-regulated learning interventions on academic achievement in online and blended environments in K-12 and higher education. Behaviour & Information Technology, 42(16): 2911–2931.

Yankson, B., Bondzie, R., Resciniti, S., Marquez, D., Chow, N., & Atele-Williams, T. (2025). Enhancing digital forensics in higher education: The role of experiential learning in bridging the skills gap. In 2025 12th IFIP

International Conference on New Technologies, Mobility and Security (NTMS), Pages 51–57. https://doi.org/10.1109/ntms65597.2025.11076904.

Zakir, S., Hoque, M.E., Susanto, P., Nisaa, V., Alam, M.K., Khatimah, H., & Mulyani, E. (2025). Digital literacy and academic performance: The mediating roles of digital informal learning, self-efficacy, and students' digital competence. Frontiers in Education, 10. https://doi.org/10.3389/feduc.2025.1590274.

Zhao, Y., Pinto Llorente, A.M., & Sánchez Gómez, M.C. (2021). Digital competence in higher education research: A systematic review. Computers & Education, 168: 104212.