

INFLUENCE OF ARTIFICIAL INTELLIGENCE AND DIGITAL LITERACY SKILLS AMONG SECONDARY SCHOOL STUDENTS IN EDO STATE

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Abstract

The purpose of this study was to examine the relationship between artificial intelligence and digital literacy skills among secondary school students in Edo State, Nigeria. The study adopted a correlational research design. Three hypotheses guided the study. The population comprised 58,742 secondary school students in public secondary schools in Edo State, while a sample of 250 students was selected using a multi-stage sampling technique. Data were collected using a structured questionnaire titled Artificial Intelligence and Digital Literacy Skills Questionnaire (AIDLSQ). The instrument was validated by experts in Curriculum and Instructional Technology and Measurement and Evaluation from the University of Benin, Benin City. A reliability of 0.81 coefficient was established using the test-retest method. Data were analyzed using simple regression analysis at the 0.05 level of significance. The findings revealed that AI-powered learning tools have a significant relationship with digital literacy skills among secondary school students. The study also found a significant relationship between AI automated feedback systems and digital literacy skills. Furthermore, AI-based information search systems were found to have a significant relationship with students' digital literacy skills. The findings indicate that the use of artificial intelligence technologies contributes positively to the development of students' ability to access, evaluate, manage, and utilize digital information effectively. The study concluded that artificial intelligence plays a significant role in enhancing digital literacy skills among secondary school students. It was recommended that schools should integrate AI technologies into teaching and learning activities and provide opportunities for students and teachers to develop competencies in the effective use of AI tools.

Keywords: Influence, Artificial Intelligence, Digital Literacy Skills.

Introduction

Education in the twenty-first century has increasingly become technology-driven, with digital technologies transforming the methods through which teaching and learning are conducted across the world. The rapid advancement of Artificial Intelligence (AI) has particularly reshaped educational practices by introducing intelligent systems that support learning, assessment, information retrieval, and personalized instruction. AI technologies such as adaptive learning platforms, automated feedback systems, virtual assistants, and AI-based information search tools are increasingly being integrated into educational environments to enhance students' learning experiences and technological competence. In both developed and developing countries, educational institutions are adopting AI-powered technologies to

improve teaching effectiveness, facilitate independent learning, and strengthen students' digital literacy skills. Consequently, digital literacy has become one of the most important competencies required for students to function effectively in modern knowledge-based societies.

Digital literacy refers to the ability to effectively access, evaluate, manage, create, and communicate information using digital technologies. It involves a broad range of technological competencies, including the ability to use digital devices, navigate online platforms, evaluate digital information critically, and apply digital tools responsibly for learning and problem-solving purposes. According to Naamati-Schneider and Alt (2024), digital literacy extends beyond basic computer operations to include the effective use of AI-powered technologies, online communication systems, and digital problem-solving skills necessary in contemporary educational environments. Similarly, Ng, Su, Leung, and Chu (2024) described digital literacy as a critical competence that enables students to participate effectively in AI-driven educational and social environments. In the same vein, Bhimavarapu (2025) explained that digital literacy encompasses technological knowledge, digital communication skills, information management abilities, and critical thinking competencies needed for effective participation in modern digital societies. These definitions indicate that digital literacy is an essential skill for secondary school students in the contemporary era of technological innovation and digital transformation. The integration of Artificial Intelligence into education has significantly influenced how students acquire digital literacy skills. AI refers to computer systems and technologies designed to simulate human intelligence by performing tasks such as learning, reasoning, decision-making, language processing, and problem-solving. In educational settings, AI technologies are used to support teaching, automate assessment, personalize learning experiences, and provide intelligent learning assistance to students. According to Imamguluyev, Hasanova, Imanova, Mammadova, Hajizada and Samadova (2024), AI-powered educational tools provide students with opportunities for personalized learning, interactive engagement, and digital skill development through intelligent technological support systems. Similarly, Saddhono, Suhita, Istanti, Kusmiatun, Kusumaningsih and Sukmono (2024) explained that AI-driven educational technologies enhance literacy development and improve students' interaction with digital learning platforms. These perspectives suggest that AI technologies have become important instruments for improving students' technological competence and promoting digital literacy development in schools.

One major dimension of AI integration in education is the use of AI-powered learning tools. AI-powered learning tools refer to intelligent educational technologies that support students' learning through adaptive instruction, virtual tutoring, interactive learning platforms, and personalized educational assistance. These tools are designed to enhance students' learning experiences by providing customized learning pathways, real-time assistance, and intelligent recommendations based on students' individual learning needs. According to Ateeq, Almuraqab, Alfiras, Alrowwad and Alhawamdeh (2025), adaptive and interactive AI tools significantly influence students' learning experiences and contribute to the development of digital literacy and advanced technological skills. Similarly, Anafa and Friday (2025) reported that AI-powered learning companions significantly improve digital literacy among secondary school students by increasing students' engagement with digital learning technologies. In addition, Meyrambaykyzy and Maratuly (2025) observed that AI-powered educational tools promote critical thinking and digital competence among secondary school learners. These

studies indicate that AI-powered learning tools may play a significant role in improving students' digital literacy skills.

Another important aspect of AI integration in education is AI automated feedback systems. AI automated feedback systems refer to intelligent technological systems that provide students with immediate, personalized, and adaptive feedback during the learning process. These systems use machine learning algorithms, automated assessment tools, and intelligent tutoring systems to evaluate students' responses, identify learning gaps, and provide corrective guidance that enhances learning outcomes. According to Wu and Zhang (2025), AI applications that provide personalized feedback significantly improve students' digital literacy and innovation skills in educational environments. Similarly, Zhang (2025) explained that automated writing evaluation systems enhance students' engagement with digital learning platforms and improve their technological competence through continuous feedback mechanisms. In the same vein, Yaseen, Mohammad, Ashal, Abusaimh, Alshurideh and Al Kurdi (2025) found that personalized AI feedback systems significantly improve students' engagement and digital literacy development. It is believed that AI automated feedback systems may contribute positively to students' digital literacy skills by increasing their interaction with digital technologies during the learning process.

AI-based information search systems also represent a significant aspect of AI application in education. AI-based information search systems refer to intelligent digital platforms and search technologies that assist users in locating, retrieving, organizing, and utilizing information from digital environments. These systems include AI-enhanced search engines, intelligent recommendation systems, generative AI tools, and digital information retrieval platforms that help students' access learning materials and educational content efficiently. According to Pu, Liang, Wang, Zhang and Li, (2024), AI-based learning systems and digital literacy significantly influence students' learning outcomes and information management abilities. Similarly, Luo, Kuang, Ng, and Zheng (2025) explained that AI information literacy significantly predicts students' ability to search, evaluate, and utilize digital information effectively. In addition, Wardhani, Indrawati and Asyiah (2025) observed that AI-enhanced digital systems and search technologies significantly strengthen students' digital literacy and information management competencies. These views suggest that AI-based information search systems can enhance students' ability to interact effectively with digital information environments and develop stronger digital literacy skills.

The growing use of AI technologies in education may raise concerns about the adequacy of digital literacy skills among secondary school students, especially in developing countries like Nigeria. Many students tend to face challenges related to inadequate technological infrastructure, limited access to digital learning tools, insufficient digital training, and poor technological competence. In Edo State, secondary schools seems to continue to experience challenges associated with limited access to AI-powered educational technologies, inadequate digital learning facilities, and insufficient exposure to modern technological learning systems. These challenges may limit students' ability to develop the digital competencies required for effective participation in contemporary educational and societal environments.

Empirical studies have shown that AI technologies might significantly improve digital literacy among students. For instance, Simanungkalit, Wardi, Jaya and Loretha (2025) reported that AI technologies have significant potential for strengthening digital literacy and data literacy among secondary school students. AI-based digital learning tools may also improve students'

digital literacy skills and technological engagement. Gökçe and Nacaroğlu (2026) also observed that the use of AI tools in secondary school education significantly improves students' digital literacy and twenty-first-century skills competencies. However, it appears few studies have specifically examined the relationship between AI-powered learning tools, AI automated feedback systems, AI-based information search systems, and digital literacy skills among secondary school students in Edo State.

Given the increasing importance of AI technologies in education and the growing demand for digital literacy competencies among students, there is a need to examine how different dimensions of AI integration influence students' digital literacy skills in secondary schools. Understanding the relationship between AI-powered learning tools, AI automated feedback systems, AI-based information search systems, and digital literacy skills is important for improving educational practices, promoting technological competence, and enhancing students' preparedness for participation in a digital society. Therefore, this study seeks to examine the relationship between AI-powered learning tools and digital literacy skills, determine the relationship between AI automated feedback systems and digital literacy skills, and investigate the relationship between AI-based information search systems and digital literacy skills among secondary school students in Edo State.

Objectives of the Study

The following research objectives guided the study:

1. To examine the relationship between AI-powered learning tools and digital literacy skills among secondary school students.
2. To determine the relationship between AI automated feedback systems and digital literacy skills among secondary school students.
3. To investigate the relationship between AI-based information search systems and digital literacy skills among secondary school students.

Research Questions

The following research questions guided the study:

1. What relationship exists between AI-powered learning tools and digital literacy skills among secondary school students?
2. What relationship exists between AI automated feedback systems and digital literacy skills among secondary school students?
3. What relationship exists between AI-based information search systems and content generation and digital literacy skills among secondary school students?

Hypotheses

The following null hypotheses were tested in the study:

1. There is no significant relationship between AI-powered learning tools and digital literacy skills among secondary school students.
2. There is no significant relationship between AI automated feedback systems and digital literacy skills among secondary school students.
3. There is no significant relationship between AI-based information systems search and content generation and digital literacy skills among secondary school students.

Methodology

This study adopted a correlational research design, which was considered appropriate for examining the relationship between artificial intelligence and digital literacy skills among secondary school students in Edo State. The design enabled the researcher to determine the

extent and direction of the relationship between the variables without manipulating them. The population comprised 58,742 students distributed across the three senatorial districts of the state: Edo North, Edo Central, and Edo South. These students formed the focus of the study because they are increasingly exposed to digital technologies and artificial intelligence applications that may influence their digital literacy skills. A sample size of 250 students was selected using a multi-stage sampling technique to ensure adequate representation of the study area. At the first stage, one Local Government Area (LGA) was randomly selected from each of the three senatorial districts. In the second stage, one public secondary school was randomly selected from each of the selected LGAs. In the final stage, students were randomly selected from the selected schools to participate in the study, resulting in a total sample of 250 respondents.

Data for the study were collected using a structured questionnaire developed by the researcher titled 'Artificial Intelligence and Digital Literacy Skills Questionnaire' (AIDLSQ). The instrument was divided into two main sections. Section A sought information on the demographic characteristics of the respondents, such as gender, age, and class level. Section B contained items structured according to the variables of the study. The first subsection measured AI-powered learning tools, the second assessed AI automated feedback systems, while the third examined AI-based information search systems. The fourth subsection measured students' digital literacy skills. The items in Section B were measured using a four-point Likert rating scale of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). This scale enabled respondents to indicate the extent to which they agreed or disagreed with each statement.

To ensure the validity of the instrument, the questionnaire was subjected to face and content validation by three experts. These included two lecturers from the Department of Curriculum and Instructional Technology, Faculty of Education, University of Benin, Benin City, and one lecturer from the Department of Measurement and Evaluation in the same university. Their observations and recommendations were used to improve the clarity, relevance, and adequacy of the instrument. A pilot study was conducted using 30 secondary school students from a public secondary school outside the selected sample area. The purpose of the pilot study was to establish the reliability of the instrument. The test-retest reliability method was used, and a reliability coefficient of 0.81 was obtained, indicating that the instrument was reliable and suitable for the study.

Prior to data collection, permission was obtained from the principals of the selected schools. The researcher, with the assistance of trained research assistants, administered the questionnaires directly to the respondents. The purpose of the study was clearly explained to the participants, and they were assured that all information provided would be treated confidentially and used solely for academic purposes. Participation was voluntary, and respondents were not required to disclose personal identities. The completed questionnaires were collected immediately after administration to ensure a high response rate and minimize data loss. The data collected for the study were analyzed using simple regression analysis at the 0.05 level of significance. This statistical technique was considered appropriate because it enabled the researcher to determine the relationship between AI-powered learning tools, AI automated feedback systems, AI-based information search systems, and digital literacy skills among secondary school students in Edo State.

Results

Hypothesis 1: There is no significant relationship between AI-powered learning tools and digital literacy skills among secondary school students.

Table 1: Regression Analysis of AI-Powered Learning Tools and Digital Literacy Skills among Secondary School Students

R	R Square	Adjusted R Square	Std. Error of the Estimate		
0.418	0.175	0.172	2.193		
Model	Sum of Squares	df	Mean Square	F	Sig
Regression	286.375	1	286.375	59.528	0.000
Residual	1193.625	248	4.813		
Total	1480.000	249			
Coefficients					
Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig
(Constant)	18.472	1.056		17.492	0.000
AI-Powered Learning Tools	0.536	0.069	0.418	7.715	0.000

Source: Field Survey, 2026

Table 1 presents the regression analysis of AI-powered learning tools and digital literacy skills among secondary school students. The result shows an F-value of 59.528 with a p-value of 0.000. Testing the hypothesis at an alpha level of 0.05, the p-value of 0.000 is less than the alpha level of 0.05. Therefore, the null hypothesis which states that there is no significant relationship between AI-powered learning tools and digital literacy skills among secondary school students is rejected. This finding implies that AI-powered learning tools significantly relate with digital literacy skills among secondary school students. The R-square value of 0.175 indicates that 17.5% of the variance in digital literacy skills is explained by AI-powered learning tools, while the remaining 82.5% may be attributed to other variables not included in the model. Furthermore, the unstandardized coefficient (B) for AI-powered learning tools is 0.536, indicating that a unit increase in AI-powered learning tools would lead to a 0.536 increase in digital literacy skills. The standardized coefficient (Beta) of 0.418 with $t = 7.715$ indicates a moderate positive predictive influence. Therefore, AI-powered learning tools significantly relate with digital literacy skills among secondary school students at the 0.05 level of significance.

Hypothesis 2

There is no significant relationship between AI automated feedback systems and digital literacy skills among secondary school students.

Table 2: Regression Analysis of AI Automated Feedback Systems and Digital Literacy Skills among Secondary School Students

R Square		Adjusted R Square		Std. Error of the Estimate		
0.367	0.135	0.132		2.264		
Model	Sum of Squares	df	Mean Square	F	Sig	
Regression	201.825	1	201.825	39.389	0.000	
Residual	1270.175	248	5.122			
Total	1472.000	249				
Coefficients						
Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig	
(Constant)	19.684	1.121		17.559	0.000	
AI Automated Feedback Systems	0.463	0.074	0.367	6.276	0.000	

Source: Field Survey, 2026

Table 2 presents the regression analysis of AI automated feedback systems and digital literacy skills among secondary school students. The result shows an F-value of 39.389 with a p-value of 0.000. Testing the hypothesis at an alpha level of 0.05, the p-value of 0.000 is less than the alpha level of 0.05. Therefore, the null hypothesis which states that there is no significant relationship between AI automated feedback systems and digital literacy skills among secondary school students is rejected. This finding implies that AI automated feedback systems significantly relate with digital literacy skills among secondary school students. The R-square value of 0.135 indicates that 13.5% of the variance in digital literacy skills is explained by AI automated feedback systems, while the remaining 86.5% may be attributed to other variables not included in the model. Furthermore, the unstandardized coefficient (B) for AI automated feedback systems is 0.463, indicating that a unit increase in AI automated feedback systems would lead to a 0.463 increase in digital literacy skills. The standardized coefficient (Beta) of 0.367 with $t = 6.276$ indicates a moderate positive predictive influence. Therefore, AI automated feedback systems significantly relate with digital literacy skills among secondary school students at the 0.05 level of significance.

Hypothesis 3

There is no significant relationship between AI-based information search systems and digital literacy skills among secondary school students.

Table 3: Regression Analysis of AI-Based Information Search Systems and Digital Literacy Skills among Secondary School Students

R	R Square	Adjusted R Square		Std. Error of the Estimate		
0.441	0.194	0.191		2.158		
Model	Sum of Squares	df	Mean Square	F	Sig	
Regression	312.640	1	312.640	67.109	0.000	
Residual	1155.360	248	4.659			
Total	1468.000	249				
Coefficients						
Model		Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig
(Constant)		17.928	1.038		17.272	0.000
AI-Based Information Search Systems	0.552		0.067	0.441	8.192	0.000

Source: Field Survey, 2026

Table 3 presents the regression analysis of AI-based information search systems and digital literacy skills among secondary school students. The result shows an F-value of 67.109 with a p-value of 0.000. Testing the hypothesis at an alpha level of 0.05, the p-value of 0.000 is less than the alpha level of 0.05. Therefore, the null hypothesis which states that there is no significant relationship between AI-based information search systems and digital literacy skills among secondary school students is rejected. This finding implies that AI-based information search systems significantly relate with digital literacy skills among secondary school students. The R-square value of 0.194 indicates that 19.4% of the variance in digital literacy skills is explained by AI-based information search systems, while the remaining 80.6% may be attributed to other variables not included in the model. Furthermore, the unstandardized coefficient (B) for AI-based information search systems is 0.552, indicating that a unit increase in AI-based information search systems would lead to a 0.552 increase in digital literacy skills. The standardized coefficient (Beta) of 0.441 with $t = 8.192$ indicates a moderate positive predictive influence. Therefore, AI-based information search systems significantly relate with digital literacy skills among secondary school students at the 0.05 level of significance.

Discussion of Findings

The findings of this study revealed that there is a significant relationship between AI-powered learning tools and digital literacy skills among secondary school students. The regression result indicated that AI-powered learning tools had a moderate positive predictive influence on digital literacy skills, suggesting that the use of AI-driven educational technologies contributes meaningfully to students' ability to access, evaluate, and utilize digital information effectively. This implies that students who frequently engage with AI-powered learning applications tend to develop stronger technological competencies, problem-solving abilities, and digital communication skills. This finding is consistent with the study of Naamati-Schneider and Alt

(2024), who reported that the integration of AI-powered assistants in education significantly enhances students' digital literacy and evolving technological skills. The authors emphasized that AI-based educational technologies improve students' ability to navigate digital platforms and utilize online resources effectively. Similarly, Ng, Su, Leung, and Chu (2024) found that AI literacy education in secondary schools significantly improves students' digital literacy competencies and prepares learners for participation in an AI-driven society. According to the authors, exposure to AI-powered learning environments promotes students' confidence and competence in digital learning activities.

The study also revealed that there is a significant relationship between AI automated feedback systems and digital literacy skills among secondary school students. The regression analysis showed that AI automated feedback systems positively influenced students' digital literacy skills. This indicates that AI-supported feedback mechanisms, such as automated assessments, intelligent tutoring systems, and personalized feedback platforms, enhance students' interaction with digital technologies and improve their digital competence. The finding suggests that students become more digitally literate when they receive timely, adaptive, and technology-driven feedback during the learning process. This result agrees with the findings of Ateeq et al. (2025), who observed that adaptive and interactive AI tools, including automated feedback mechanisms, significantly influence the development of students' digital literacy and academic skills. The authors stressed that AI-driven feedback systems support active learning and technological engagement among learners. In the same vein, Yaseen et al. (2025) reported that personalized feedback and interactive AI tools significantly improve student engagement and digital literacy development. Their study revealed that AI-enhanced feedback systems enable students to interact more effectively with digital learning platforms, thereby strengthening their digital competencies.

Furthermore, the findings revealed that there is a significant relationship between AI-based information search systems and digital literacy skills among secondary school students. The result indicates that the use of AI-based search systems positively contributes to students' ability to locate, evaluate, interpret, and utilize digital information effectively. This suggests that students who frequently use AI-supported information retrieval systems, search engines, and content generation tools develop stronger digital literacy competencies and critical information management skills. This finding supports the study of Pu et al. (2024), who found that AI-based learning and digital literacy significantly influence students' learning outcomes and information management abilities. According to the authors, AI-supported information systems enhance students' capacity for independent learning and digital engagement. Similarly, Luo et al. (2025) reported that AI information literacy factors significantly predict high school students' competence in searching, evaluating, and utilizing digital information. The authors emphasized that AI-based information search tools improve students' digital awareness and strengthen their information literacy skills in modern learning environments.

Conclusion

The study concluded that AI-powered learning tools have a significant positive relationship with digital literacy skills among secondary school students. The findings demonstrated that students' engagement with AI-driven educational technologies contributes substantially to the development of their digital competencies, including information access, evaluation, communication, and problem-solving skills. The study further established that AI automated feedback systems significantly enhance digital literacy by providing personalized, timely, and

technology-driven feedback that promotes active interaction with digital learning platforms. In addition, the findings revealed that AI-based information search systems significantly contribute to students' ability to locate, evaluate, interpret, and utilize digital information effectively. Overall, the study highlights the important role of AI technologies in fostering digital literacy skills among secondary school students and underscores the need for their effective integration into educational practices to prepare learners for participation in an increasingly digital and AI-driven world.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Schools should encourage the integration and regular use of AI-powered learning tools in classroom instruction to enhance students' digital literacy skills and technological competencies.
2. Educational administrators should provide teachers and students with access to AI automated feedback systems that offer timely and personalized feedback to support digital learning and skill development.
3. Teachers should be trained on the effective use of AI-powered educational technologies to maximize their potential in improving students' digital literacy outcomes.
4. Schools should promote the use of AI-based information search and content generation tools to help students develop stronger information retrieval, evaluation, and digital information management skills.

References

- Anafa, D. M & Akpan, C. F. (2025). Design and evaluation of an adaptive ai-powered learning companion for enhancing digital literacy in Nigerian secondary schools. *Journal of Science Innovation and Technology Research*, 10(9).
- Ateeq, A., Almuraqab, N. A. S., Alfiras, M., Alrowwad, A., & Alhawamdeh, H. M. (2025). The impact of adaptive and interactive AI tools on student learning: From digital literacy to advanced skills. *International Journal of Educational Development*, 112, 103154.
- Bhimavarapu, U. (2025). Smart digital literacy: AI-powered solutions for skill development. In *Rethinking Literacy in the Era of Sustainability and AI*. IGI Global.
- Gökçe, H., & Nacaroglu, O. (2026). The effect of the use of artificial intelligence tools in science education on secondary school students' 21 st century skills competency perceptions and digital literacy. *Education and Information Technologies*, 31(4), 1059-1077.
- Imamguluyev, R., Hasanova, P., Imanova, T., Mammadova, A., Hajizada, S., & Samadova, Z. (2024). Ai-powered educational tools: Transforming learning in the digital era. *International Research Journal of Modernization in Engineering Technology and Science*, 6, 920-929.
- Luo, M., Kuang, Z., Ng, D. T. K., & Zheng, Z. (2025). Exploring the influential factors and key dimensions of AI information literacy among high school students: A social-ecological perspective. *Interactive Learning Environments*, 1–18.
- Meyrambaykyzy, K. A., & Maratuly, A. A. (2025, November). Development of an Ai-Powered tool for enhancing critical thinking in secondary education: a Case Study. In *2025 25th International Conference on Control, Automation and Systems (ICCAS)* (pp. 701-706). IEEE.
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- Naamati-Schneider, L., & Alt, D. (2024). Beyond digital literacy: The era of AI-powered assistants and evolving user skills. *Education and Information Technologies*, 29(8), 10215–10234.
- Ng, D. T. K., Su, J., Leung, J. K. L., & Chu, S. K. W. (2024). Artificial intelligence (AI) literacy education in secondary schools: A review. *Interactive Learning Environments*, 32(5), 1456–1472.
- Pu, L., Liang, J., Wang, N., Zhang, N., & Li, Y. (2024). Impact of AI-based learning, digital literacy, information stewardship on learning outcomes. *El Profesional de la Información*, 33(4), 330412.
- Saddhono, K., Suhita, R., Istanti, W., Kusmiatun, A., Kusumaningsih, D., & Sukmono, I. K. (2024). AI-Powered Language Learning: Enhancing Literacy in the Digital Age. In 2024 4th International Conference on Advancement in Electronics & Communication Engineering (AECE) (pp. 856-861). IEEE.
- Sidik, D. P., Irawijayanti, F., & Fatqurhohman, F. (2025). The role of artificial intelligence in enhancing digital and data literacy among secondary school students: A systematic literature review. *JINEA: Journal of Innovation in Education and Learning*, 1(3), 173-188.
- Simanungkalit, I., Wardi, W., Jaya, C. A., & Loretha, A. F. (2024). The effectiveness of AI-based video to increase digital literacy in junior high school. *Journal of Curriculum Indonesia*, 7(1), 9-16.
- Wardhani, I. S., Indrawati, I., & Asyiah, I. N. A. I. N. (2025). AI (artificial intelligence)-enhanced digital literacy in science learning: A systematic literature review. *Journal of Educational Sciences*, 9(4), 1957-1970.
- Wu, D., & Zhang, J. (2025). Generative artificial intelligence in secondary education: Applications and effects on students' innovation skills and digital literacy. *PLoS One*, 20(5), 0323349.
- Yaseen, H., Mohammad, A. S., Ashal, N., Abusaimh, H., Alshurideh, M., & Al Kurdi, B. (2025). The impact of adaptive learning technologies, personalized feedback, and interactive AI tools on student engagement: The moderating role of digital literacy. *Sustainability*, 17(3), 2145.
- Zhang, Z. V. (2025). Digital literacy in the age of artificial intelligence: exploring student engagement with automated writing evaluation (awe) feedback. *Práxis Educacional*, 21(52), 17102-17102.