



Assessing Student Independence for Effective Learning via Digital Modules in Economics

Friyatmi^{1*}, Tuti Kamila Sukma¹, Socheath Mam²

¹Universitas Negeri Padang, Padang, Indonesia

²University of Phnom Penh, Phnom Penh, Cambodia

Article History:

Received: July 10, 2025

Revised: September 30, 2025

Accepted: October 06, 2025

Published: October 07, 2025

Keywords:

Digital Modules,
Effective learning,
Learner Autonomy.

*Correspondence Author:

fri.yatmi@fe.unp.ac.id

Abstract: Due to Generation Z's lack of learning autonomy and limited digital learning resources, the utilization of digital modules that consider students' needs is critical. This study aimed to examine student independence in economics learning that integrates digital modules. An experimental design with a posttest-only control group was applied, comparing students who used digital modules with those who relied on printed modules. Treatment effects were assessed using an independent sample t-test. The results show that digital modules significantly enhanced students' independence. This finding suggests that digital modules are not only effective in strengthening 21st-century learning competencies but also provide practical guidance for educators in designing more learner-centered instructional materials. Moreover, the results provide helpful ideas for policymakers in promoting the digitalization of curriculum resources to support student independence and educational quality improvement.

INTRODUCTION

Education plays an important role on the quality of human resources (Indrayani, Nurdyansyah, & Ruchana, 2020; Sudarsana, 2015; Wijaya, Sudjimat, & Nyoto, 2016). The significant technological surge that resulted from the Fourth Industrial Revolution (Benavides, Tamayo Arias, Arango Serna, Branch Bedoya, & Burgos, 2020) has influenced the ease of information access in the digital realm, transforming the educational paradigm and allowing individuals to acquire knowledge without boundaries or time constraints (Bond, Marín, Dolch, Bedenlier, & Zawacki-Richter, 2018; Bygstad, Øvrelid, Ludvigsen, & Dæhlen, 2022). This not only increases resource accessibility, but also emphasises the importance of improving learning quality through the use of various methods and digital content (Chiu, Lin, & Lonka, 2021; Dalgıç, Yaşar, & Demir, 2024; Rahayu, Pramuswari, Santya, Oktariani, & Fatimah, 2023). Education must be digitalised in order to align output quality with workforce requirements (Das, 2019; Haddad & Draxler, 2002). The digital era enables the availability of easily accessible learning resources and media, making learning more interactive and engaging (Harahap, Syafitri, & Ramadhani, 2023; Utomo, 2023; Zebua & Sibarani, 2023). Educators must be able to adapt and incorporate technology into learning in order to provide various conveniences

and engage students' interest, thereby determining the success of the learning process (Munna & Kalam, 2021; Setyowati, Sari, & Habibah, 2018).

Despite the progress in advanced learning technology, challenges in its integration into education persist today. Teaching in many senior high schools still relies heavily on textbooks and printed modules, which are relatively inflexible and lack interactivity in meeting diverse learning need, even students from rural areas often face limited access to learning resources (Yi & Siqian, 2025). Such dependence often results in monotonous instruction and reduced student engagement (Mustika, 2015). However, recent studies suggest that digital technologies are becoming more integrated into students' daily life. In Indonesia, for example, more than 90% of young aged 15-24 own and actively use cellphones, and internet penetration is higher than 78% nationally ((BPS), 2022; APJII, 2023). This disparity between the continual existence of conventional educational approaches and students' ubiquitous access to digital resources emphasizes the importance of more interactive and adaptive digital learning modules. Such resources are not only consistent with students' technological realities, but they are also critical for fostering engagement, participation, and autonomy.

The limited learning independence of Generation Z, particularly in the aftermath of the COVID-19 pandemic, has been documented by numerous studies (Damayanti & Raharjo, 2020; Mulyadi Rusli, 2019). Although students are well-versed in digital technology, data suggests that gadgets are widely utilized for non-educational purposes such as gaming and social media, potentially reducing time allocated to academic activities (APJII, 2023; UNESCO, 2022). If left unaddressed, such patterns risk producing graduates with lower resilience, weaker problem-solving skills, and limited competitiveness in adapting to rapidly changing demands. Learning independence is therefore essential for enabling students to develop relevant skills and knowledge. Importantly, independence is not an innate characteristic but can be fostered through external supporting factors, including a learning environment that encourages creativity, critical thinking, and active participation in more useful and better learning. Within this context, the purposeful use of digital learning resources represents a promising strategy. Numerous studies demonstrate that Generation Z's strong digital literacy can be harnessed to design engaging and adaptive learning experiences, thereby fostering greater autonomy and responsibility in their learning process (Caporarello, Manzoni, Cirulli, & Magni, 2020; Hermawan, Dwidienawati, & Hapsari, 2023).

Teachers may produce digital learning resources in a variety of formats, each offering particular advantages for instructional practice. Among these, digital modules stand out as user-friendly tools that may assist students learn autonomously. While their development may still require a basic level of digital literacy, teachers with limited technical knowledge may generally develop and implement them in the classroom. Importantly, when these modules are designed contextually based on learners' backgrounds, needs, and real-life situations they not only promote engagement but also contribute to a more meaningful and effective learning process (Damayanti & Raharjo, 2020; Mulyadi Rusli, 2019).

Teachers may develop digital learning resources in a variety of formats, each with particular advantages for instructional practice. Among these, digital modules stand out as user-friendly tools that may assist students learn autonomously. While their creation may still require a basic level of digital literacy, teachers with less technical knowledge may generally develop and apply them in the classroom. Furthermore, when these modules are designed contextually based on learners' backgrounds, needs, and real-life situations they not only promote engagement but also foster a more meaningful and effective learning process (Damayanti & Raharjo, 2020; Mulyadi Rusli, 2019). Despite their growing use, research examining the specific role of digital modules in strengthening students' learning independence remains limited. This research aims to address this gap by assessing the extent to which digital modules can increase student independence and overall learning effectiveness and contribute to the renewal of learning.

METHOD

This study employed an experimental research using a posttest-only control group design (Creswell, 2012). Two intact 11th-grade classes from a senior high school in Pesisir Selatan Regency, West Sumatra, were selected through purposive random sampling, considering the similarity of class characteristics and the school's readiness for digital devices. A total of 64 students took part, with 32 in the experimental group and 32 in the control group. The experimental group received treatment in the form of contextual digital modules for economics learning, including interactive features such as movies, practice problems, and self-assessment quizzes. The control group, on the other hand, experienced conventional classroom instruction, using printed textbooks providing as the main learning resource. This posttest-only design was chosen because it is effective in identifying treatment effects without the potential bias that may arise from pretest sensitization (Campbell & Stanley, 2015).

Students' learning independence was assessed using a questionnaire based on Zimmerman's (2000) factors, which included independence from others, self-confidence, discipline, responsibility, initiative, and self-control. The measure used a five-point Likert scale, from strongly disagree to strongly agree, with numerous negative items included to assess answer consistency (Wijaya et al., 2016). Prior to data collection, the instrument was piloted on a comparable sample, and the reliability test revealed a Cronbach's Alpha coefficient of 0.87, showing strong internal consistency. Two educational psychologists also examined the content validity. Data analysis involved both descriptive and inferential statistics. An independent samples t-test was employed to compare the mean posttest scores in the experimental and control groups. Before running the test, considerations or assumptions of normality and homogeneity of variance are assessed to ensure that the analysis is adequate.

RESULT AND DISCUSSION

Student Learning Experience using Digital Modules

The experiment was conducted over four meetings covering the topic of Banks and Financial Institutions in economics. In the experimental class, students engaged by using

digital modules containing text, videos, quizzes, and simulations. Their learning activities demonstrated key indicators of independence: they began exploring materials without waiting for teacher direction (initiative), collaborated in group discussions with minimal intervention (responsibility), and effectively managed time by alternating between individual and group tasks (discipline and self-control). The teacher served mostly as a facilitator, providing technical aid and clarifying topics only when students required it, fostering greater autonomy. This pattern reflects the principles of self-regulated learning, where learners actively plan, monitor, and evaluate their own understanding (Zimmerman, 2002). The integration of digital modules also supports student-centered learning, as technology enhances engagement and enables personalized exploration of content (Means et al., 2014). Consequently, the classroom dynamic shifted from teacher-directed to learner-driven, aligning with the constructivist approach that emphasizes active knowledge construction through meaningful experiences (Jonassen, 1999).

By contrast, students in the control class relied on printed modules and indicated lower levels of autonomous learning. Their activities were mostly limited to reading teacher-assigned sections, passively waiting for explanations, and reproducing knowledge rather than critically engaging with it. Group work was less dynamic, and students relied primarily on teacher guidance, showing a lack of initiative and self-confidence. In this group, the teacher performed a more directive role, providing frequent explanations and suggestions that limited opportunities for self-regulation. Overall, the observed differences indicate that the digital module fostered higher student independence through exploration, collaboration, and self-monitoring, whereas the printed module emphasized teacher-centered and less independent behaviors. The distinctions are summarized in Table 1.

Table 1. Differences in Student Learning Activities

Aspect	Experimental Class (Digital Module)	Control Class (Printed Module)
Learning Initiatives	Students take an active role in their education. They actively explore the module's contents, use the module's external links to access additional learning resources, and seek information independently outside of class. Many students also ask the teacher if there is anything they don't understand.	The initiative remains low. Students are accustomed to waiting teacher explanations without exploring the material on their own. Learning activities are increasingly teacher-centered.
Discipline and Time Management	Students become more disciplined in completing the learning stages because the digital module provides a clear schedule and achievement indicators. In addition, they appear to be more organized in their study habits, such as completing tasks independently and on time.	Some students still appear passive and inconsistent when it comes to task completion. Time management for studying is determined by the teacher's instructions, so independence remains limited.
Independence from Teachers.	Students can learn on their own more effectively. They are accustomed to completing module exercises	The teacher is heavily relied upon. Learning activities work best when

	independently and do not always rely on teacher explanations.	the teacher is present and provides direct guidance.
Use of Technology and Interactivity	The digital module includes interactive elements such as videos, digital quizzes, and links to additional learning materials, making learning activities more dynamic and engaging.	Learning is more static, with textbooks and lectures as the primary resources. There is no technological interaction that encourages further exploration of learning.
Self-Control in Learning	Students can manage and direct their own learning more effectively without supervision. They learn with self-awareness, even outside of the classroom.	Without direct teacher supervision, students are easily distracted and struggle to maintain focus.

A well-designed digital module not only offers content, but it also promotes student initiative, engagement, and self-regulation—all of which are important characteristics of learning independence (Dio, 2022). In this study, organized materials, supported by images, videos, and interactive activities, enabled students in the experimental group to investigate economic issues more actively and confidently. Previous studies have found that digital modules enhance conceptual understanding by giving multimodal explanations and self-paced learning options (Fontaine et al., 2017; Samulski et al., 2018; Shrestha et al., 2024). Consistent with these findings, we found that using contextual digital modules greatly enhanced students' understanding of banking and financial institution concepts when compared to printed modules.

These findings emphasize the importance of developing digital modules not only as content sources, but also as instruments that promote active participation, reflection, and lessen reliance on direct instructor teaching. Educators may integrate videos, quizzes, and simulations into economics modules to create a more student-centered setting that fosters conceptual mastery and independent learning (Azizah, Supriana, & Sulur, 2023).

At the policy level, schools and curriculum developers should prioritize the integration of digital modules into classroom instruction by providing proper teacher training, improving access to digital infrastructure, and aligning curriculum standards with technology-enhanced learning practices. Such efforts are particularly relevant in the post-pandemic period, when digital literacy and autonomous learning have become critical skills. By implementing the adoption of contextual digital modules, education stakeholders can contribute to the larger aims of increasing student autonomy, fostering equal access to learning resources, and preparing students to flourish in a digitally driven economy.

The use of digital modules has been shown to significantly improve students' independence, as evidenced by the higher post-test scores in learning independence for the experimental group compared to the control group ($p < 0.01$). With intuitive navigation features, students were able to learn independently without relying heavily on the teacher, while teachers functioned more as facilitators who guided learning activities. This shift enabled students to manage their time effectively, complete tasks within deadlines, and enhance their problem-solving skills when encountering challenges. Such outcomes demonstrate that digital modules provide flexibility and individualization tailored to

learners' needs (Samulski, La, & Wu, 2016). These findings are consistent with prior studies suggesting that digital learning resources assist to establish independent learning settings in which students actively engage with the material, facilitating both learning and competence assessment (Birkness-Gartman, White, Salimian, & Voltaggio, 2022; Ruiz, Mintzer, & Leipzig, 2006). As a result, students became active participants rather than passive recipients of teaching, demonstrating that digital modules are an effective tool for developing the independence required in 21st-century education.

Assessing Student Learning Independence

The product's effectiveness is assessed through the use of digital modules in learning and its impact on students' learning independence. The difference test of student independence was used to analyze the effectiveness test in both the control and experimental classes. The use of digital learning resources as well as printed versions in both classes demonstrates the ability to encourage student learning independence, but the results vary. Based on observations and analysis of the learning independence questionnaire, it appears that students who use digital modules have greater learning independence than those who use printed modules, as shown in Table 2.

The effectiveness of the digital modules was assessed by examining their impact on students' learning independence. An independent samples *t*-test was performed to compare the post-test scores of the experimental group (digital modules) and the control group (printed modules). The results revealed a statistically significant difference between the two groups, with the experimental class demonstrating higher levels of learning independence. This suggests that the use of interactive digital modules effectively enhanced students' autonomy, initiative, and self-regulation in learning (Zimmerman, 2002). These findings indicate that when learners interact with multimedia-based content that provides immediate feedback, varied representations, and flexible pacing, they are more likely to take ownership of their learning process (Broadbent & Poon, 2015). Furthermore, the integration of digital resources encourages students to set goals, monitor progress, and reflect on their learning outcomes key components of self-regulated learning (Panadero, 2017). In line with constructivist learning theory, the digital environment provides opportunities for exploration and collaboration, allowing students to construct knowledge through active engagement rather than passive reception (Jonassen, 1999). Overall, the results support the notion that technology-enhanced learning environments can significantly improve students' independence and readiness for lifelong learning.

The findings are consistent with previous studies indicating that technology-supported learning environments promote greater student engagement and self-directed learning behaviors compared to traditional materials (Broadbent & Poon, 2015; Sun & Chen, 2016). Therefore, the integration of digital modules not only facilitated content comprehension but also fostered essential 21st-century learning skills such as self-management and reflective learning. The experimental group outperformed the control group in terms of mean score ($M = 4.48$), with a statistically significant difference ($p < 0.01$). According to the results of the learning independence questionnaire, students in the

experimental class displayed higher levels of autonomy, including initiative, self-confidence, discipline, responsibility, and self-control, than students in the control class.

Table 2. Assesment of Students Independence

No	Indicator	Mean	
		Experiment	Control
1	Independence from others	4.59	4.52
2	Self-confidence	4.52	4.39
3	Discipline behavior	4.36	4.35
4	Responsibility	4.37	4.36
5	Initiative	4.48	4.44
6	Self-control	4.58	4.49
		4.48	4.42

When students use digital modules, testing on all aspects of independence demonstrates greater learning independence. This suggests that digital modules can foster a learner-centred learning environment, allowing for learning independence (Donkin, Hatje, & Reinke, 2022). Table 3 shows that hypothesis testing demonstrates a significant difference in learning independence between the two classes. This testing demonstrates that using digital modules is effective in improving students' learning independence.

Table 3. Hypothesis Testing

No	Indicator	Mean	SD	t	df	Sig.
1	Experiment	89.03	5.17	97.393	31	0.000
2	Control	86.41	4.05	123.331	31	

The findings indicate that using digital modules in Economics education significantly improves students' learning independence. The average scores on the learning independence questionnaire, which includes six indicators, show an increase. Students who used digital modules performed better on almost all of these indicators, with the most noticeable improvement in the indicators of independence from others and self-control. These findings are consistent with previous research, which has found that using digital modules is effective in fostering student learning independence (Abidin & Walida, 2019; Andriani & Dwiningsih, 2024; Ayunda, Hasanah, & Ariyanti, 2024; Bukhori, Gani, & Yahya, 2024; Sanova, Bakar, Afrida, Kurniawan, & Aldila, 2022).

Several factors contribute to the effectiveness of digital modules in promoting student learning independence, as demonstrated by the findings of this study. Results found that students in the experimental class improved significantly in self-regulation, time management, and task completion, supporting previous studies on the advantages of flexible digital learning (Cramer, Ross, Plant, & Pschibul, 2018). The modules enabled students to establish their own learning speed and access resources independently, encouraging initiative and reducing dependency on teacher explanations. Interactive and visually appealing components, such as videos, interactive quizzes, and external investigation connections, sparked curiosity and active participation, in line with constructivist learning principles (Tarigan, Sipahutar, & Harahap, 2021). Observational

data proved that students regularly employed these multimedia features to clarify concepts and reinforce comprehension, consistent with previous research on multimedia's usefulness for autonomous learning (Errabo & Ongoco, 2024; Hutain & Michinov, 2022).

Teacher feedback reinforced the practical benefits of digital modules. Referring to the teacher view the switch from printed books to digital modules as enhanced teaching independence and practicality, allowing teaching to be conducted using a smartphone. Figure 1 reveal increased activities during teaching, including the utilization of videos and interactive quizzes. Furthermore, self-assessment elements and quick feedback during the courses allowed students to track their own understanding, resulting in faster conceptual mastery and increased confidence during exams (Everaert & Safari, 2021).

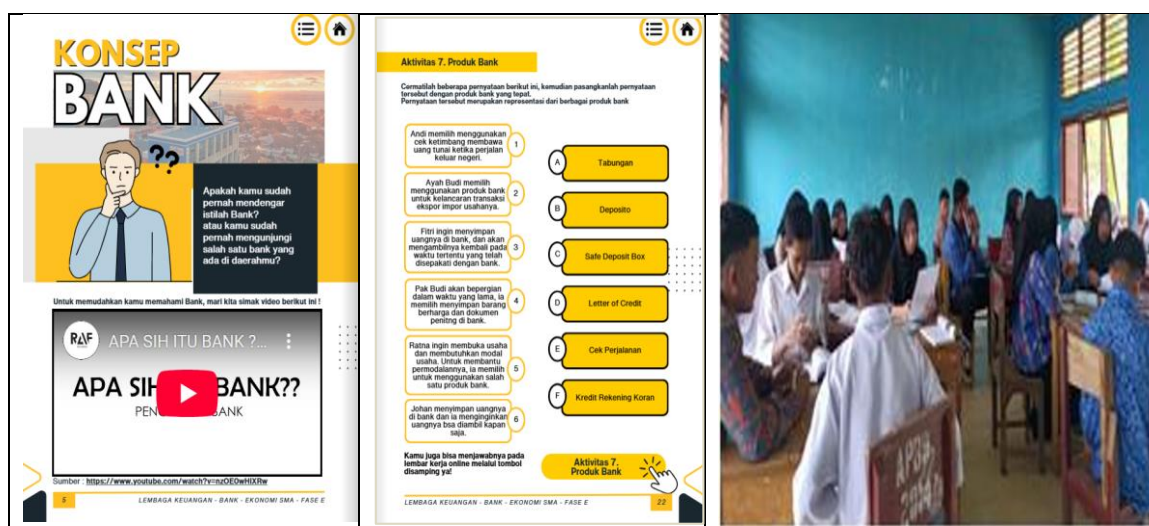


Figure 1. Teaching activities and materials

Finally, the study discovered that digital modules allowed students to enhance their digital literacy, which is an important component for encouraging independent learning in the twenty-first century (Mufidah, Indana, & Arifin, 2023; Ningrum & Ambarwati, 2023). The combination of structured materials, multimedia interaction, and interactive self-assessment improved students' understanding of economic topics while also increasing their independence as active learners. Overall, our findings provide empirical evidence that well-designed digital modules are valuable pedagogical instruments in modern economics education, promoting both student autonomy and innovative teaching techniques. These results underscore the transformative potential of integrating technology into classroom instruction, where learning becomes more personalized, participatory, and reflective (Means et al., 2014). Moreover, fostering digital literacy and self-regulated learning through digital modules aligns with global education goals that emphasize lifelong learning and adaptability in an evolving digital economy (UNESCO, 2022).

From a theoretical perspective, this study contributes to the growing body of research on constructivist and self-regulated learning frameworks. The use of digital modules in this context exemplifies how technology can operationalize constructivist principles by allowing students to build meaning through exploration, reflection, and collaboration (Jonassen, 1999). In addition, the observed improvement in students' initiative and

discipline reinforces the notion that self-regulated learning is not merely a cognitive process but also a motivational one, where learners are empowered to take responsibility for their own academic growth (Panadero, 2017; Zimmerman, 2002). These theoretical implications support the argument that technology, when thoughtfully designed, can serve as a catalyst for fostering independent learning behaviors and higher-order thinking skills.

Practically, the findings provide actionable insights for educators and curriculum developers. The successful integration of digital modules suggests that digital pedagogy can complement conventional instruction without diminishing the teacher's role. Instead, it redefines the teacher as a facilitator who guides inquiry, provides scaffolding, and supports learners in navigating complex content (Broadbent & Poon, 2015). Schools and universities should therefore consider investing in the design and implementation of interactive learning materials that are adaptable to different learning styles and contexts. Furthermore, ongoing professional development for teachers in digital pedagogy is essential to maximize the impact of these tools, ensuring that educators can create learning environments that balance structure and autonomy.

Future research could extend this study by exploring how digital modules influence other dimensions of student learning, such as critical thinking, collaboration, and problem-solving abilities. Longitudinal studies may also reveal how sustained exposure to digital learning environments shapes students' motivation and academic resilience over time. Additionally, cross-disciplinary applications such as integrating digital modules into mathematics, science, or social studies could provide broader insights into how technology-enhanced learning supports diverse educational goals. As education continues to evolve in response to technological and societal change, understanding how digital tools promote independence and engagement will remain a central challenge for researchers and practitioners alike

CONCLUSION

The findings of this study indicate that employing digital modules in teaching economics has significant effects on students' learning independence. The experimental class had a significantly higher mean score (89.03) than the control class (86.41), as shown by an independent samples t-test ($p < 0.01$). These findings suggest that digital modules promote greater autonomy by allowing students to learn flexibly, engage actively with knowledge, and maintain discipline in task completion, all of which contribute to the development of 21st-century learning skills. The findings suggest that digital modules can be effectively integrated into economics education to foster student independence while also motivating teachers to use more learner-centered pedagogical technique. However, this study was limited to 11th-grade high school students in Pesisir Selatan Regency, West Sumatra, with an emphasis on banks and financial institutions. Future study should broaden the context by include larger and more varied samples, as well as new features like discussion forums and automated essay assessments, to better understand the function of digital modules in developing higher-order thinking and collaborative learning.

ACKNOWLEDGMENT

We would like to express our gratitude to the Institute for Research and Community Service at Universitas Negeri Padang for the support provided under contract number 1410/UN35.15/LT/2024.

REFERENCE

- Abidin, Z. S., & Walida, S. (2019). Interactive E-Module Model of Transformation Geometry Based on Case (Creative, Active, Systematic, Effective) as A Practical and Effective Media to Support Learning Autonomy and Competence. *Brazilian Journal of Implantology and Health Sciences*, 1(7), 206-223. <https://doi.org/10.36557/2674-8169.2019v1n7p206-223>
- Andriani, N., & Dwiningasih, K. (2024). Development of An Interactive E-Module Based on Blended Learning to Enhance Student Independence and Learning Outcomes. *Jurnal Kependidikan: Jurnal Hasil Penelitian dan Kajian Kepustakaan di Bidang Pendidikan, Pengajaran dan Pembelajaran*, 10(2), 792-801. <https://doi.org/10.33394/jk.v10i2.11733>
- Ayunda, A. D., Hasanah, H., & Ariyanti, N. A. (2024). Development of a Flipped (BPS), B. P. S. (2022). *Statistik telekomunikasi Indonesia 2022*. <https://www.bps.go.id/id/publication/2023/08/31/131385d0253c6aae7c7a59fa/statistik-telekomunikasi-indonesia-2022.html>
- Azizah, Z., Supriana, E., & Sulur, S. (2023). Development of Interactive E-Modules with a Multi-representational Approach to Help Students Analyze the Effect of Heat and Heat Transfer for Grade XI Senior High School. *International Journal of Education and Teaching Zone*, 2(3), 460-474. <https://doi.org/10.57092/ijetz.v2i3.136>
- Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital transformation in higher education institutions: A systematic literature review. *Sensors*, 20(11), 3291. <https://doi.org/10.3390/s20113291>
- Birkness-Gartman, J. E., White, M. J., Salimian, K. J., & Voltaggio, L. (2022). Web-based pathology modules with virtual slides are effective for teaching introductory gastrointestinal pathology concepts. *Academic Pathology*, 9(1), 100059. <https://doi.org/10.1016/j.acpath.2022.100059>
- Bond, M., Marín, V. I., Dolch, C., Bedenlier, S., & Zawacki-Richter, O. (2018). Digital transformation in German higher education: student and teacher perceptions and usage of digital media. *International journal of educational technology in higher education*, 15(1), 1-20. <https://doi.org/10.1186/s41239-018-0130-1>
- Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education*, 27, 1–13. <https://doi.org/10.1016/j.iheduc.2015.04.007>
- Bukhori, A., Gani, H. A., & Yahya, M. (2024). Digital Module Development of Islamic Education to Improve Student Independence in Learning at Middle School Program.

- Journal of Multidisciplinary Academic and Practice Studies*, 2(1), 67-84.
<https://doi.org/10.35912/jomaps.v2i1.1961>
- Bygstad, B., Øvrelid, E., Ludvigsen, S., & Dæhlen, M. (2022). From dual digitalization to digital learning space: Exploring the digital transformation of higher education. *Computers & Education*, 182, 104463.
<https://doi.org/10.1016/j.compedu.2022.104463>
- Campbell, D. T., & Stanley, J. C. (2015). *Experimental and quasi-experimental designs for research*: Ravenio books.
- Chiu, T. K., Lin, T.-J., & Lonka, K. (2021). Motivating online learning: The challenges of COVID-19 and beyond. *The asia-pacific education researcher*, 30(3), 187-190.
<https://doi.org/10.1007/s40299-021-00566-w>
- Cramer, K. M., Ross, C., Plant, L., & Pschibul, R. (2018). Efficacy of learning modules to enhance study skills. *International Journal of Technology and Inclusive Education*, 7(1), 1251-1259. <https://doi.org/10.20533/ijtie.2047.0533.2018.0153>.
- Creswell, J. W. (2012). Educational reserach: Planning, conducting, and evaluating quantitative and qualitative research.
- Dalgıç, A., Yaşar, E., & Demir, M. (2024). ChatGPT and learning outcomes in tourism education: The role of digital literacy and individualized learning. *Journal of Hospitality, Leisure, Sport & Tourism Education*, 34, 100481.
<https://doi.org/10.1016/j.jhlste.2024.100481>
- Damayanti, A. N., & Raharjo, R. (2020). Validitas flipbook interaktif pada materi sistem pernapasan manusia untuk melatihkan kemampuan berpikir kritis siswa kelas XI SMA. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, 9(3), 443-450.
<https://doi.org/10.31538/adrg.v5i2.2294>
- Donkin, R., Hatje, E., & Reinke, N. B. (2022). An eLearning module is comparable to face-to-face teaching in a nursing human pathophysiology subject. *Nurse education today*, 113, 105377. <https://doi.org/10.1016/j.nedt.2022.105377>
- Errabo, D. D., & Ongoco, A. A. (2024). Effects of interactive-mobile learning modules in students' engagement and understanding in genetics. *Journal of Research in Innovative Teaching & Learning*, 17(2), 327-351. <https://doi.org/10.1108/JRIT-12-2023-0133>
- Everaert, P., & Safari, M. (2021). Digital self-contained module to assist a writing task on evaluating the financial, social, and environmental performance of a company: Teaching note. *Journal of Accounting Education*, 57, 100752.
<https://doi.org/10.1016/j.jaccedu.2021.100752>
- Fontaine, G., Cossette, S., Maheu-Cadotte, M.-A., Mailhot, T., Deschênes, M.-F., & Mathieu-Dupuis, G. (2017). Effectiveness of adaptive e-learning environments on knowledge, competence, and behavior in health professionals and students: protocol for a systematic review and meta-analysis. *JMIR research protocols*, 6(7), e8085.
<https://doi.org/10.2196/resprot.8085>
- Harahap, H., Syafitri, S. E., & Ramadhani, D. (2023). Pelatihan Penggunaan Platform Digital Sebagai Media Pembelajaran Bagi Guru PAUD IT Bismillah. *Jurnal Pengabdian Dharma Wacana*, 4(1), 67-78. <https://doi.org/10.37295/jpdw.v4i1.404>

- Hermawan, E., Dwidienawati, D., & Hapsari, A. W. (2023). What are Digital Skills Still Lacking to Survive in Digital World? *WSEAS Transactions on Computer Research*, 11, 73-81. <https://doi.org/10.37394/232018.2023.11.11>
- Hutain, J., & Michinov, N. (2022). Improving student engagement during in-person classes by using functionalities of a digital learning environment. *Computers & Education*, 183, 104496. <https://doi.org/10.1016/j.compedu.2022.104496>
- Indrayani, I., Nurdyansyah, N., & Ruchana, S. (2020). School Development Strategies in Improving the Quality of Human Resources at Elkisi High School. *Proceedings of The ICECRS*, 6. <https://doi.org/10.21070/icecrs.v6i0.1050>
- Jonassen, D. H. (1999). *Designing constructivist learning environments*. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: A new paradigm of instructional theory* (Vol. II, pp. 215–239). Lawrence Erlbaum Associates.
- Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2014). *The effectiveness of online and blended learning: A meta-analysis of the empirical literature*. Teachers College Record, 115(3), 1–47. <https://doi.org/0.1177/016146811311500307>
- Mufidah, A., Indana, S., & Arifin, I. S. Z. (2023). E-module based on blended learning type flipped classroom on climate change materials to train students' digital literacy ability. *International Journal of Current Educational Research*, 2(1), 1-16. <https://doi.org/10.53621/ijocer.v2i1.204>
- Mulyadi Rusli, L. A. (2019). Meningkatkan kognitif siswa SMAN I Jambi melalui modul berbasis e-book kvisoft flipbook maker. *Jurnal Sistem Komputer dan Informatika (JSON) Hal*, 59, 68. <https://doi.org.10.30865/json.v1i1.1397>
- Munna, A. S., & Kalam, M. A. (2021). Teaching and learning process to enhance teaching effectiveness: a literature review. *International Journal of Humanities and Innovation (IJHI)*, 4(1), 1-4. <https://doi.org/10.33750/ijhi.v4i1.94>
- Mustika, Z. (2015). Urgenitas media dalam mendukung proses pembelajaran yang kondusif. *CIRCUIT: Jurnal Ilmiah Pendidikan Teknik Elektro*, 1(1). <https://doi.org/10.22373/crc.v1i1.311>
- Ningrum, N. I., & Ambarwati, R. (2023). Development of Flipbook-Based E-Module on Animalia Material As Teaching Material To Train Digital Literacy of Class X High School Students. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, 12(2), 525-538. <https://doi.org/10.26740/bioedu.v12n2.p525-538>
- Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology*, 8, 422. <https://doi.org/10.3389/fpsyg.2017.00422>
- Rahayu, I. T., Pramuswari, M. F., Santya, M., Oktariani, R., & Fatimah, S. (2023). Analisis hasil pengaruh perkembangan iptek terhadap hasil belajar siswa SD/MI. *HYPOTHESIS: Multidisciplinary Journal Of Social Sciences*, 2(01), 97-110. <https://doi.org/10.62668/hypothesis.v2i01.645>
- Ruiz, J. G., Mintzer, M. J., & Leipzig, R. M. (2006). The impact of e-learning in medical education. *Academic medicine*, 81(3), 207-212. <https://doi.org/10.1097/00001888-200603000-00002>

- Samulski, T. D., La, T., & Wu, R. I. (2016). Adaptive eLearning modules for cytopathology education: a review and approach. *Diagnostic Cytopathology*, 44(11), 944-951. <https://doi.org/10.1002/dc.23521>
- Samulski, T. D., Taylor, L. A., La, T., Mehr, C. R., McGrath, C. M., & Wu, R. I. (2018). The utility of adaptive eLearning in cervical cytopathology education. *Cancer cytopathology*, 126(2), 129-135. <https://doi.org/10.1002/cncy.21930>
- Sanova, A., Bakar, A., Afrida, A., Kurniawan, D. A., & Aldila, F. T. (2022). Digital literacy on the use of e-module towards students' self-directed learning on learning process and outcomes evaluation courses. *JPI (Jurnal Pendidikan Indonesia)*, 11(1), 154-164. <https://doi.org/10.23887/jpi-undiksha.v11i1.40959>
- Setyowati, R. N., Sari, M. M. K., & Habibah, S. M. (2018). *Improving critical thinking skills of students through the development of teaching materials*. Paper presented at the 1st International Conference on Social Sciences (ICSS 2018). <https://doi.org/10.2991/icss-18.2018.41>
- Shrestha, S., Dahlke, S., Butler, J. I., Hunter, K., Fox, M. T., Davidson, S., . . . Moody, E. (2024). Nursing Students' Perceptions on a Pain Management E-Learning Module: An Exploratory Quantitative Study. *Pain Management Nursing*, 25(2), e138-e143. <https://doi.org/10.1016/j.pmn.2023.12.005>
- Sudarsana, I. K. (2015). Peningkatan mutu pendidikan luar sekolah dalam upayapembangunan sumber daya manusia. *Jurnal Penjaminan Mutu*, 1(1), 1-14. <https://doi.org/10.25078/jpm.v1i1.35>
- Sun, A., & Chen, X. (2016). Online education and its effective practice: A research review. *Journal of Information Technology Education: Research*, 15, 157–190. <https://doi.org/10.28945/3502>
- Tarigan, W. P. L., Sipahutar, H., & Harahap, F. (2021). The effect of interactive digital learning module on student's learning activity and autonomy. *Bioedukasi: Jurnal Pendidikan Biologi*, 14(2), 196. <https://doi.org/10.24114/bioedukasi.v14i2.24221>
- UNESCO. (2022). *lobal education monitoring report: Technology in education – A tool on whose terms?* <https://unesdoc.unesco.org/ark:/48223/pf0000382231>
- Utomo, F. T. S. (2023). Inovasi Media Pembelajaran Interaktif Untuk Meningkatkan Efektivitas Pembelajaran Era Digital Di Sekolah Dasar. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 8(2), 3635-3645. <https://doi.org/10.23969/jp.v8i2.10066>
- Yi, W., & Siqian, W. (2025). Digital Literacy Education Among Students: Status, Pathways, and Implications in the Current Digital Era. *International Journal of Education and Teaching Zone*, 4(1), 66-85. <https://doi.org/10.57092/ijetz.v4i1.385>
- Zebua, S., & Sibarani, M. (2023). Peningkatan Kreativitas Guru Pendidikan Agama Kristen Melalui Pengembangan Materi Pembelajaran Digital. *Sinar Kasih: Jurnal Pendidikan Agama dan Filsafat*, 1(1), 101-115. <https://doi.org/10.55606/sinarkasih.v1i1.133>
- 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