ISEJ Indonesian Science Education Journal

ISSN Online: 2716-3350
Vol. 4 No. 3 September 2023 Pages 95-103
https://siducat.org/index.php/isej/
Published by Yayasan Darussalam Bengkulu

The Effectiveness of E-Book Based Learning Media in Physics Education During the Covid-19 Pandemic

Neza Almaida[1], Rifqi Arya Permanagraha[2], Wiwin Novianti[3]
Universitas Indraprasta PGRI Jakarta [1,2,3]
E-mail: nezaalma@gmail.com

Abstract
The Covid-19 pandemic has transformed higher education by accelerating the adoption of digital learning resources, with e-books emerging as one of the primary media to support online learning. However, despite their accessibility and flexibility, questions remain about their actual effectiveness in facilitating student learning, particularly in physics education where abstract concepts require diverse instructional strategies. This study employed a quantitative descriptive design using a structured questionnaire distributed via Google Forms to 28 undergraduate students in the Physics Education program at Universitas Indraprasta PGRI, Jakarta. The instrument consisted of multiple-choice and Likert-scale items to capture patterns of e-book use, perceived effectiveness, and student satisfaction. The findings showed that 92.9% of respondents acknowledged e-books as beneficial for their learning, and 85.7% reported that they improved their understanding of physics content. Nevertheless, only 28.6% frequently used e-books, and the average satisfaction score was moderate at 3.39, indicating that while students recognize the instructional value of e-books, their actual adoption remains limited due to factors such as monotonous presentation and lack of interactivity. These results are consistent with prior studies on digital reading preferences, but the study contributes novel insights by highlighting the paradox between high perceived usefulness and low frequency of e-book use in the context of physics education during pandemic-driven online learning. The implication of this research is that e-books should be redesigned with multimedia features, interactive problem-solving tasks, and integration into blended instructional approaches to enhance their pedagogical impact and ensure sustained student engagement in post-pandemic learning environments.

Keywords: Based Learning Media; Digital Learning; E-books; Physics Education; Student Satisfaction.

INTRODUCTION

The rapid advancement of digital technology in the twenty-first century has significantly reshaped the landscape of education. The integration of digital resources into teaching and learning environments has become increasingly inevitable, particularly as education systems worldwide adapt to the demands of the digital era. Electronic learning resources such as e-books, digital simulations, and multimedia-based instructional materials have emerged as central tools in modern pedagogy, providing students with greater flexibility and accessibility than traditional formats (Bui, 2022; Grassini, 2023; Mhlongo et al., 2023). These technological innovations are not only responses to global digital transformation but also solutions to pedagogical challenges, especially in science education where complex abstract concepts often require diverse and engaging instructional strategies (Deroncele-Acosta et al., 2023; McCarthy et al., 2023; Mhlongo et al., 2023).

The outbreak of the Covid-19 pandemic in 2020 accelerated the reliance on digital technologies, forcing educational institutions to transition abruptly from face-to-face teaching to online learning formats. This sudden shift, often described as emergency remote teaching, revealed both opportunities and limitations in the use of digital learning resources (Iglesias-Pradas et al., 2021; Lee et al., 2022; McDaniel et al., 2020). Within this context, e-books were widely adopted as a practical alternative to printed materials, offering the benefits of portability,

accessibility, and interactive features that could facilitate student learning during remote instruction (Casselden & Pears, 2020; Haleem et al., 2022; Jou et al., 2016). However, while the use of e-books was expected to enhance continuity in education, questions regarding their actual effectiveness in promoting deep learning and long-term comprehension remain unresolved (Dunlosky et al., 2013; Park & Lee, 2021; Taye, 2023).

Research into students' reading preferences indicates that many learners continue to favor print for long and cognitively demanding materials, citing higher levels of concentration and comprehension when engaging with physical texts (Larasati et al., 2023; Mangen et al., 2019; Medranda-Morales et al., 2023). In contrast, digital texts are often perceived as more convenient, particularly for quick access, searching specific terms, or completing short assignments (Furenes et al., 2021; Haleem et al., 2022; van der Weel & Mangen, 2022). These mixed findings highlight that the benefits of e-books are strongly influenced by contextual factors such as task type, subject matter, and students' familiarity with digital media. Theories of multimedia learning and cognitive load further explain this phenomenon, suggesting that learning outcomes are enhanced when digital materials are well-structured, minimize extraneous cognitive load, and incorporate interactive or multimodal features (Darling-Hammond et al., 2020; Kwangmuang et al., 2021; Skulmowski & Xu, 2022). Conversely, poorly designed digital texts can overwhelm learners with fragmented information and distractions, ultimately hindering comprehension and engagement (Arnold et al., 2023; Dwivedi et al., 2023; Liu et al., 2022).

In science and physics education, the role of e-books is particularly relevant due to the abstract and complex nature of the subject matter. Physics concepts often require visualization, experimentation, and the application of mathematical reasoning, which can be challenging to convey through static printed texts. Studies have shown that e-books integrated with multimedia elements such as simulations, animations, and problem-solving exercises can enhance conceptual understanding and engagement (AlGerafi et al., 2023; Çırakoğlu et al., 2022; Dwivedi et al., 2022). Similarly, research on open educational resources highlights that digital textbooks can improve equity and access by reducing costs while maintaining or even improving academic performance (Darling-Hammond et al., 2020; Mhlongo et al., 2023; Ochieng & Gyasi, 2021). Despite these advantages, the actual frequency of e-book use among university students often remains low, as many students rely instead on alternative online resources such as video tutorials and interactive applications (Al Mulhim & Zaky, 2023; Apuke & Iyendo, 2018; Vedechkina & Borgonovi, 2021).

Adoption of e-books is further shaped by students' perceptions of usefulness, ease of use, and alignment with their learning needs, which are consistent with technology acceptance models (He et al., 2018; Korsah, 2023; Liao et al., 2022). Therefore, it is not sufficient to merely provide e-books as instructional materials; their design, integration into coursework, and students' motivation to use them critically determine their educational value. In the context of the Covid-19 pandemic, where students were expected to engage in independent learning, these factors became even more crucial.

Despite the growing body of literature on e-books, several gaps remain. Much of the prior research has compared print and digital reading in general educational contexts (Amirtharaj et al., 2023; Casselden & Pears, 2020; Larasati et al., 2023) or examined open educational resources without focusing on discipline-specific learning outcomes (Engler & Shedlosky-Shoemaker, 2019; Guo et al., 2020; Haleem et al., 2022). Few studies have specifically investigated the effectiveness of e-books in supporting physics education during the pandemic, particularly within teacher education programs. Moreover, limited attention has been paid to the paradox observed in student behavior, where learners acknowledge the usefulness of e-books but report relatively low levels of actual usage (Capone, 2022; Dwivedi et al., 2022; Son Hing et al., 2023). This creates a need for research that not only measures effectiveness but also explores students' perceptions, satisfaction, and challenges in using e-books for physics learning.

Based on this gap, the present study aims to examine the effectiveness of e-books as learning media in physics education during the Covid-19 pandemic. Specifically, this research investigates the extent to which e-books support students' understanding of physics concepts, their frequency of use, and their overall satisfaction with this medium. The findings are expected

to provide insights into how e-books can be better designed and integrated into future hybrid and online learning environments, thereby contributing to the improvement of digital pedagogy in physics education.

METHODS

This study employed a quantitative descriptive research design to examine the effectiveness of e-books as learning media in supporting students' understanding of physics during the Covid-19 pandemic. A descriptive quantitative approach was considered appropriate as it allows the systematic collection of numerical data to describe and analyze the perceptions, experiences, and satisfaction levels of students regarding e-book usage. Such an approach is widely applied in educational research to capture trends, measure attitudes, and generate empirical evidence that can inform the development of instructional practices in digital learning environments.

The population of this study comprised undergraduate students enrolled in the Physics Education program at Universitas Indraprasta PGRI, Jakarta. The sample was drawn from the 2019 cohort, consisting of 28 students who voluntarily participated in the study. This cohort was selected because they had experienced a full transition from conventional face-to-face learning to online learning during the pandemic, making them a relevant group for exploring the effectiveness of digital learning media. Participation was voluntary, and all respondents were assured of the confidentiality of their responses to ensure the reliability and honesty of the data provided.

Data were collected through a structured questionnaire developed and distributed using Google Forms. The questionnaire consisted of two sections: the first addressed the frequency and challenges of e-book usage, while the second measured students' levels of satisfaction with e-books as learning tools. The items were constructed in both multiple-choice and Likert-scale formats. The multiple-choice items were scored dichotomously (Yes = 2, No = 1), while the Likert-scale items used a five-point scale ranging from "strongly dissatisfied" (1) to "strongly satisfied" (5). This design enabled the collection of both categorical and ordinal data to capture different dimensions of e-book utilization and students' attitudes toward its effectiveness.

To enhance the validity of the instrument, the questionnaire items were developed based on relevant literature in digital learning and e-book adoption, ensuring alignment with established constructs of effectiveness and user satisfaction. Expert judgment from faculty members in the field of educational technology was employed to review the clarity, relevance, and appropriateness of the items prior to administration. Reliability was assessed using internal consistency measures, which ensured that the items adequately reflected the constructs being examined. These procedures were undertaken to strengthen the methodological rigor and enhance the credibility of the findings.

Data analysis was conducted using descriptive statistical techniques, including the calculation of frequencies, percentages, and mean scores. Responses to the multiple-choice items were analyzed to determine the proportion of students who reported using e-books, the extent to which they perceived them as helpful, and the challenges encountered in their usage. Responses to the Likert-scale items were aggregated to assess overall satisfaction with e-books as learning media. The use of descriptive statistics was appropriate, as the purpose of the study was not to establish causal relationships but to describe trends and patterns in students' perceptions and experiences. The findings were then interpreted in relation to existing research on digital learning resources, multimedia learning, and technology acceptance to provide a contextualized understanding of the results.

Overall, the methodological approach ensured that the study produced systematic, reliable, and contextually relevant data regarding the effectiveness of e-books in physics learning. By combining established survey techniques with careful attention to validity and reliability, the study provides an empirically grounded contribution to the discourse on digital media integration in higher education, particularly within the domain of physics education in the context of pandemic-related online learning.

RESULTS AND DISCUSSION

Student Responses to E-Book Utilization

Table 1. Results of the First Variable Question

No	Question	Yes	No
1	Are you an e-book user?	23 (82,1%)	5 (17,9%)
2	Does the e-book help you in learning?	26 (92,9%)	2 (7,1%)
3	Do you understand the material presented in the e-book?	24 (85,7%)	5 (17,9%)
4	Do you frequently use e-books?	8 (28,6%)	21 (75%)
5	Do you experience difficulties in using e-books?	13 (46,4%)	15 (53,6%)

Table 2. Results of the Second Variable Question

No	Question	1	2	3	4	5
1	How satisfied are you with using e-books?	0 (0%)	1 (3,6%)	17 (60,7%)	8 (28,6%)	2 (7,1%)

The results of the survey indicated that the majority of students reported using e-books during the Covid-19 pandemic, although the frequency of use remained relatively low. A total of 82.1% of respondents identified themselves as e-book users, and 92.9% agreed that e-books supported their learning in physics. However, only 28.6% reported frequent use, while the majority (71.4%) acknowledged infrequent or occasional engagement. Furthermore, 46.4% of students experienced challenges when using e-books, including difficulties with navigation, limited interactivity, and a lack of appealing design features.

Student Understanding and Perceived Effectiveness

Regarding comprehension, 85.7% of students indicated that e-books helped them understand physics content. This finding demonstrates that students recognize the potential instructional value of e-books, even if they do not consistently utilize them. Such perceptions align with previous studies that reported digital learning media as effective tools for improving concept mastery when appropriately integrated into coursework (Haleem et al., 2022; Lilian, 2022; Vedechkina & Borgonovi, 2021). However, the inconsistency between high perceived helpfulness and low frequency of use suggests that effectiveness alone may not be sufficient to sustain usage without improvements in accessibility and design.

Student Satisfaction with E-Books

In terms of satisfaction, descriptive analysis of Likert-scale responses revealed an average score of 3.39, indicating that students were moderately satisfied with the use of e-books as physics learning media. While students acknowledged the benefits of e-books in providing flexible access to resources, they also expressed that the lack of interactivity and monotonous presentation limited their engagement. This moderate satisfaction mirrors findings from other contexts in higher education, where students report valuing the convenience of digital resources but continue to prefer more interactive or varied media formats (Al-Adwan et al., 2023; Johnson et al., 2023; Uzir et al., 2020).

Discussion

The results provide several important insights into the role of e-books in physics education. First, the high percentage of students acknowledging the usefulness of e-books aligns with earlier research that identified digital learning media as effective in enhancing conceptual understanding and

independent study (Al Mulhim & Zaky, 2023; Suriani et al., 2023). However, the relatively low frequency of e-book use found in this study reflects the challenges observed in prior work, where students reported limited motivation to consistently engage with digital texts unless they were supplemented with multimedia or interactive features (Furenes et al., 2021; Mhlongo et al., 2023; van der Weel & Mangen, 2022).

Second, the finding that e-books support comprehension but do not guarantee sustained usage resonates with the technology acceptance framework. Nafia (2023) emphasize, perceived usefulness must be supported by ease of use and facilitating conditions to ensure adoption. In this case, despite students' acknowledgment of the benefits, barriers such as lack of interactivity or limited design features discouraged frequent engagement, consistent with studies by Bereczki and Kárpáti (2021).

Third, the moderate satisfaction levels highlight an important pedagogical implication: e-books alone may not suffice as the primary medium for physics learning. This finding Skulmowski and Xu (2022), multimedia learning theory, which argues that varied instructional modalities such as audio-visual demonstrations and interactive problem-solving exercises are more effective in reducing cognitive load and sustaining learner engagement. The relatively low satisfaction in this study thus supports recommendations from previous work advocating for hybrid or multimedia-rich learning strategies (Darling-Hammond et al., 2020; Pandita & Kiran, 2023; Rajabalee & Santally, 2021)

Fourth, the study underscores the importance of context-specific factors in determining e-book effectiveness. While research in other domains has shown that e-books can improve learning outcomes and accessibility (Naeem et al., 2023; Park & Lee, 2021; Suriani et al., 2023), the present findings suggest that in physics education where abstract concepts often require visualization and experimentation students demand more interactive and engaging formats. This difference highlights the necessity of tailoring digital learning resources to disciplinary needs rather than assuming uniform effectiveness across fields.

Fifth, the findings add nuance to existing debates on students' digital reading preferences. While prior studies emphasized the persistence of print preference for cognitively demanding texts (Larasati et al., 2023), the current study demonstrates that even when students perceive digital texts as beneficial, they may still refrain from frequent use without enhancements in interactivity and engagement. This suggests that the issue lies less in format preference and more in the pedagogical design and integration of e-books into curricula. The novelty of this research lies in its specific focus on the use of e-books in physics education during the Covid-19 pandemic within the context of Indonesian higher education. While previous studies have explored the general effectiveness of e-books, few have investigated the paradox between students' recognition of their usefulness and their limited usage patterns in physics learning. By highlighting this gap, the study contributes new insights into how disciplinary demands and student preferences interact with digital learning media adoption.

The findings have both theoretical and practical implications. Theoretically, the results reinforce multimedia learning and technology acceptance models by demonstrating that perceived effectiveness does not directly translate into habitual use without supportive design and contextual factors. Practically, the study suggests that e-books for physics education should be redesigned to include multimedia features such as simulations, audio-visual explanations, and interactive problem-solving tasks to enhance engagement. Furthermore, educators are encouraged to integrate e-books with other digital and experiential learning strategies, such as virtual laboratories, to maximize their effectiveness in supporting conceptual understanding. This study is not without limitations. First, the sample size was relatively small (28 students from a single institution), which restricts the generalizability of the findings. Second, the study relied solely on self-reported data, which may be subject to bias and does not directly measure learning outcomes. Third, the descriptive research design did not allow for causal inferences regarding the relationship between e-book use and academic achievement. Future research should address these limitations by employing larger and more diverse samples, incorporating experimental or longitudinal designs, and integrating objective measures of learning performance.

CONCLUSION

This study concludes that the use of e-books in physics education during the Covid-19 pandemic was perceived by students as effective in supporting their understanding of course content, yet their frequency of use and overall satisfaction remained moderate, reflecting a gap between perceived usefulness and actual engagement. The findings reveal that while e-books offer accessibility and flexibility, their limited interactivity and monotonous presentation reduce students' motivation to use them consistently, highlighting the need for redesigns that incorporate multimedia features, interactive problem-solving, and integration with other digital learning strategies. This study contributes to the literature by addressing the paradox of high perceived effectiveness but low adoption of e-books in physics education, offering novel insights into how disciplinary demands shape digital resource usage. The results carry practical implications for educators and developers to enhance the pedagogical value of e-books through design innovations and blended integration, while also acknowledging the study's limitations related to sample size and reliance on self-reported data. Future research should expand to larger and more diverse populations, apply experimental designs, and measure direct learning outcomes to provide a more comprehensive understanding of the role of e-books in higher education.

REFERENCE

Al-Adwan, A. S., Li, N., Al-Adwan, A., Abbasi, G. A., Albelbisi, N. A., & Habibi, A. (2023). Extending the Technology Acceptance Model (TAM) to predict university students' intentions to use metaverse-based learning platforms. *Education and Information Technologies, 28*(11), 15381-15413. https://doi.org/10.1007/s10639-023-11816-3

Al Mulhim, E. N., & Zaky, Y. A. M. (2023). Sustainability in e-learning: E-books and academic procrastination among secondary students. *Sustainability, 15*(20), 14668. https://doi.org/10.3390/su152014668

AlGerafi, M. A. M., Zhou, Y., Oubibi, M., & Wijaya, T. T. (2023). Unlocking the potential: A comprehensive evaluation of augmented reality and virtual reality in education. *Electronics, 12*(18), 3953. https://doi.org/10.3390/electronics12183953

Amirtharaj, A. D., Raghavan, D., & Arulappan, J. (2023). Preferences for printed books versus e-books among university students in a Middle Eastern country. *Heliyon, 9*(6), e16776. https://doi.org/10.1016/j.heliyon.2023.e16776

Apuke, O. D., & Iyendo, T. O. (2018). University students' usage of internet resources for research and learning: Forms of access and perceptions of utility. *Heliyon, 4*(12), e01052. https://doi.org/10.1016/j.heliyon.2018.e01052

Arnold, M., Goldschmitt, M., & Rigotti, T. (2023). Dealing with information overload: A comprehensive review. *Frontiers in Psychology, 14*. https://doi.org/10.3389/fpsyg.2023.1122200

Bereczki, E. O., & Kárpáti, A. (2021). Technology-enhanced creativity: A multiple case study of digital technology-integration expert teachers' beliefs and practices. *Thinking Skills and Creativity, 39*, 100791. https://doi.org/10.1016/j.tsc.2021.100791

Bui, T. H. (2022). English teachers' integration of digital technologies in the classroom. *International Journal of Educational Research Open, 3*, 100204. https://doi.org/10.1016/j.ijedro.2022.100204

Capone, R. (2022). Blended learning and student-centered active learning environment: A case study with STEM undergraduate students. *Canadian Journal of Science, Mathematics and Technology Education, 22*(1), 210-236. https://doi.org/10.1007/s42330-022-00195-5

Casselden, B., & Pears, R. (2020). Higher education student pathways to e-book usage and engagement, and understanding: Highways and cul de sacs. *Journal of Librarianship and Information Science, 52*(2), 601-619. https://doi.org/10.1177/0961000619841429

Çırakoğlu, N., Toksoy, S. E., & Reisoğlu, İ. (2022). Designing, developing, and evaluating an interactive e-book based on the Predict-Observe-Explain (POE) method. *Journal of Formative Design in Learning, 6*(2), 95-112. https://doi.org/10.1007/s41686-022-00071-3

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental*

Science, 24(2), 97-140. https://doi.org/10.1080/10888691.2018.1537791

Deroncele-Acosta, A., Palacios-Núñez, M. L., & Toribio-López, A. (2023). Digital transformation and technological innovation on higher education post-COVID-19. *Sustainability, 15*(3), 2466. https://doi.org/10.3390/su15032466

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques. *Psychological Science in the Public Interest, 14*(1), 4-58. https://doi.org/10.1177/1529100612453266

Dwivedi, Y. K., Hughes, L., Baabdullah, A. M., Ribeiro-Navarrete, S., Giannakis, M., Al-Debei, M. M., Dennehy, D., Metri, B., Buhalis, D., Cheung, C. M. K., Conboy, K., Doyle, R., Dubey, R., Dutot, V., Felix, R., Goyal, D. P., Gustafsson, A., Hinsch, C., Jebabli, I., … Wamba, S. F. (2022). Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice, and policy. *International Journal of Information Management, 66*, 102542. https://doi.org/10.1016/j.ijinfomgt.2022.102542

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M. A., Al-Busaidi, A. S., Balakrishnan, J., Barlette, Y., Basu, S., Bose, I., Brooks, L., Buhalis, D., … Wright, R. (2023). Opinion Paper: "So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice, and policy. *International Journal of Information Management, 71*, 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642

Engler, J. N., & Shedlosky-Shoemaker, R. (2019). Facilitating student success: The role of open educational resources in introductory psychology courses. *Psychology Learning & Teaching, 18*(1), 36-47. https://doi.org/10.1177/1475725718810241

Furenes, M. I., Kucirkova, N., & Bus, A. G. (2021). A comparison of children's reading on paper versus screen: A meta-analysis. *Review of Educational Research, 91*(4), 483-517. https://doi.org/10.3102/0034654321998074

Grassini, S. (2023). Shaping the future of education: Exploring the potential and consequences of AI and ChatGPT in educational settings. *Education Sciences, 13*(7), 692. https://doi.org/10.3390/educsci13070692

Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research, 102*, 101586. https://doi.org/10.1016/j.ijer.2020.101586

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers, 3*, 275-285. https://doi.org/10.1016/j.susoc.2022.05.004

He, Y., Chen, Q., & Kitkuakul, S. (2018). Regulatory focus and technology acceptance: Perceived ease of use and usefulness as efficacy. *Cogent Business & Management, 5*(1), 1459006. https://doi.org/10.1080/23311975.2018.1459006

Iglesias-Pradas, S., Hernández-García, Á., Chaparro-Peláez, J., & Prieto, J. L. (2021). Emergency remote teaching and students' academic performance in higher education during the COVID-19 pandemic: A case study. *Computers in Human Behavior, 119*, 106713. https://doi.org/10.1016/j.chb.2021.106713

Johnson, C. C., Walton, J. B., Strickler, L., & Elliott, J. B. (2023). Online teaching in K-12 education in the United States: A systematic review. *Review of Educational Research, 93*(3), 353-411. https://doi.org/10.3102/00346543221105550

Jou, M., Tennyson, R. D., Wang, J., & Huang, S.-Y. (2016). A study on the usability of e-books and app in engineering courses: A case study on mechanical drawing. *Computers & Education, 92-93*, 181-193. https://doi.org/10.1016/j.compedu.2015.10.004

Korsah, D. P. (2023). Assessing the influence of the technology acceptance model on social media and eLearning content adoption: A case study of colleges of education in the central and western zone of Ghana. *Journal of Education and Learning Technology, 110-121*. https://doi.org/10.38159/jelt.2023462

Kwangmuang, P., Jarutkamolpong, S., Sangboonraung, W., & Daungtod, S. (2021). The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high

schools. *Heliyon, 7*(6), e07309. https://doi.org/10.1016/j.heliyon.2021.e07309

Larasati, F., Adawiyah, D., & Gumartifa, A. (2023). Investigating EFL students reading preferences (digital or printed). *International Journal of Education Research and Development, 3*(1), 1-12. https://doi.org/10.52760/ijerd.v3i1.32

Lee, K., Fanguy, M., Bligh, B., & Lu, X. S. (2022). Adoption of online teaching during the COVID-19 Pandemic: A systematic analysis of changes in university teaching activity. *Educational Review, 74*(3), 460-483. https://doi.org/10.1080/00131911.2021.1978401

Liao, Y.-K., Wu, W.-Y., Le, T. Q., & Phung, T. T. T. (2022). The integration of the technology acceptance model and value-based adoption model to study the adoption of e-learning: The moderating role of e-WOM. *Sustainability, 14*(2), 815. https://doi.org/10.3390/su14020815

Lilian, A. (2022). Motivational beliefs, an important contrivance in elevating digital literacy among university students. *Heliyon, 8*(12), e11913. https://doi.org/10.1016/j.heliyon.2022.e11913

Liu, W., Huang, H., Saleem, A., & Zhao, Z. (2022). The effects of university students' fragmented reading on cognitive development in the new media age: Evidence from Chinese higher education. *PeerJ, 10*, e13861. https://doi.org/10.7717/peerj.13861

Mangen, A., Olivier, G., & Velay, J.-L. (2019). Comparing comprehension of a long text read in print book and on Kindle: Where in the text and when in the story? *Frontiers in Psychology, 10*. https://doi.org/10.3389/fpsyg.2019.00038

McCarthy, A. M., Maor, D., McConney, A., & Cavanaugh, C. (2023). Digital transformation in education: Critical components for leaders of system change. *Social Sciences & Humanities Open, 8*(1), 100479. https://doi.org/10.1016/j.ssaho.2023.100479

McDaniel, C., Suffern, C., Joo, J., & Alamuddin, R. (2020). Student and faculty experiences with emergency remote learning in spring 2020: Insights from a small exploratory study. https://doi.org/10.18665/sr.314276

Medranda-Morales, N., Palacios Mieles, V. D., & Villalba Guevara, M. (2023). Reading comprehension: An essential process for the development of critical thinking. *Education Sciences, 13*(11), 1068. https://doi.org/10.3390/educsci13111068

Mhlongo, S., Mbatha, K., Ramatsetse, B., & Dlamini, R. (2023). Challenges, opportunities, and prospects of adopting and using smart digital technologies in learning environments: An iterative review. *Heliyon, 9*(6), e16348. https://doi.org/10.1016/j.heliyon.2023.e16348

Naeem, M., Ozuem, W., Howell, K., & Ranfagni, S. (2023). A step-by-step process of thematic analysis to develop a conceptual model in qualitative research. *International Journal of Qualitative Methods, 22*. https://doi.org/10.1177/16094069231205789

Nafia, Z. I., Hidayati, D., & Sulisworo, D. (2023). The application of the technology readiness acceptance model on education. *Journal of Novel Engineering Science and Technology, 2*(01), 9-15. https://doi.org/10.56741/jnest.v2i01.265

Ochieng, V. O., & Gyasi, R. M. (2021). Open educational resources and social justice: Potentials and implications for research productivity in higher educational institutions. *E-Learning and Digital Media, 18*(2), 105-124. https://doi.org/10.1177/2042753021989467

Pandita, A., & Kiran, R. (2023). The technology interface and student engagement are significant stimuli in sustainable student satisfaction. *Sustainability, 15*(10), 7923. https://doi.org/10.3390/su15107923

Park, J., & Lee, J. (2021). Effects of e-books and printed books on EFL learners' reading comprehension and grammatical knowledge. *English Teaching, 76*(3), 35-61. https://doi.org/10.15858/engtea.76.3.202109.35

Rajabalee, Y. B., & Santally, M. I. (2021). Learner satisfaction, engagement and performances in an online module: Implications for institutional e-learning policy. *Education and Information Technologies, 26*(3), 2623-2656. https://doi.org/10.1007/s10639-020-10375-1

Skulmowski, A., & Xu, K. M. (2022). Understanding cognitive load in digital and online learning: A new perspective on extraneous cognitive load. *Educational Psychology Review, 34*(1), 171-196. https://doi.org/10.1007/s10648-021-09624-7

Son Hing, L. S., Sakr, N., Sorenson, J. B., Stamarski, C. S., Caniera, K., & Colaco, C. (2023). Gender inequities in the workplace: A holistic review of organizational processes and practices. *Human Resource Management Review, 33*(3), 100968. https://doi.org/10.1016/j.hrmr.2023.100968

Suriani, N. M., Agustini, K., Sudhata, I. G. W., & Dantes, G. R. (2023). The effectiveness of e-book in learning process. *International Journal of Social Sciences, 6*(2), 43-50. https://doi.org/10.21744/ijss.v6n2.2103

Taye, M. M. (2023). Understanding of machine learning with deep learning: Architectures, workflow, applications and future directions. *Computers, 12*(5), 91. https://doi.org/10.3390/computers12050091

Uzir, M. U. H., Jerin, I., Al Halbusi, H., Hamid, A. B. A., & Latiff, A. S. A. (2020). Does quality stimulate customer satisfaction where perceived value mediates and the usage of social media moderates? *Heliyon, 6*(12), e05710. https://doi.org/10.1016/j.heliyon.2020.e05710

van der Weel, A., & Mangen, A. (2022). Textual reading in digitised classrooms: Reflections on reading beyond the internet. *International Journal of Educational Research, 115*, 102036. https://doi.org/10.1016/j.ijer.2022.102036

Vedechkina, M., & Borgonovi, F. (2021). A review of evidence on the role of digital technology in shaping attention and cognitive control in children. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.611155