13 (3) (2024) 248-258

Unnes Science Education Journal

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A Recent Study on Flipbook as Media Implementation in Science Education in Digital Age: A Systematic Literature Review

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DOI: http://dx.doi.org/10.15294/usej.v13i1.17200

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Article Info

Submitted 2024-11-03
Revised 2024-11-22
Accepted 2024-12-30

Keywords

Flipbook; Digital Learning; Review Analysis; Science Education

Abstract

Flipbooks are interesting reference books for student learning. The integration of digital media in education has become crucial in the digital age, and flipbooks have gained popularity as an interactive tool. This systematic literature review investigates the effectiveness and implementation of flipbooks in science education from 2017 to 2024. This study employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method. We reviewed journal articles indexed in Scopus and Sinta, focusing on the use of flipbooks in science education. Our review highlights the effectiveness of flipbooks in improving student engagement, motivation, and learning outcomes in science education. The flipbook's interactive features, such as multimedia elements and simulations, have proven to support diverse learning styles. The adoption of flipbooks in science education shows promise for enhancing the digital literacy of students and educators. However, further empirical research is required to understand its long-term impacts and the best strategies for implementation.

How to Cite

Unayah, H., Rasyid, M., Suyanta, S., Wilujeng, I., & Rahmawati, L. (2024). A Recent Study on Flipbook as Media Implementation in Science Education in Digital Age: A Systematic Literature Review. *Unnes Science Education Journal*, 13(3), 248-258.

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p-ISSN 2252-6617
e-ISSN 2502-6232

INTRODUCTION

Information and communication technology (ICT) is transitioning toward a completely digital business at an accelerating rate (Adiyono et al., 2024). In the middle of society, education can help a more advanced civilization to evolve (Nurmayanti & Ferdiansyah, 2021). A strong and well-executed educational system is essential to producing the nation's future generation of competent, intelligent, and morally upright people (Fausta et al., 2024). This will provide equitable educational opportunities and allow for the enhancement of education management in a planned, directed, and sustainable way. The right to learn must be equal for all students. Consequently, a suitable educational system may help students become productive members of society and promote sustainable development (Damopolii et al., 2021).

In the learning process, students are not merely engaged in conversations with peers or classmates; they are also expected to actively contribute to the overall learning experience. Student engagement can be assessed based on their level of participation in learning activities (Nikou, 2024). Such activities are instrumental in developing individual potential and fostering behavioral changes in learning, making it essential to provide students with opportunities to participate (Besare, 2020). Moreover, student motivation plays a crucial role in influencing their involvement in learning (Papavlasopoulou et al., 2019). A lack of motivation can lead to decreased performance and suboptimal learning outcomes (Damopolii et al., 2018). One effective approach teachers can adopt is incorporating media into the classroom to encourage students to become more active learners (Hasanah, 2021; Setyantoko et al., 2023).

The choice of media and teaching methods employed by educators significantly influences the extent of student engagement with the subject matter (Edu et al., 2021; Harso et al., 2021). Higher levels of student activity are closely associated with improved academic performance, while reduced activity often results in lower achievement. Learning media serve to clarify or visualize concepts that may be challenging to grasp through verbal or written communication alone (Sari, 2022). Selecting media that align with students' needs, subject content, classroom dynamics, and available technological resources is essential for effective learning (Syamsunir & Agussalim, 2021). One solution to address this challenge is providing easily accessible learning resources through Android-based platforms (Amalia, 2022). A flipbook is an example of Android-compatible media that can be utilized in the learning process (Yomaki et al., 2023).

Introduction contains of the purpose of article/research that is formulated and presented by adequate introduction and avoids detail references and research result presentation. Provision source adequate learning is component important in the learning process. Source Study is all source messages, people, materials, tools, techniques, and settings that can be used student in a way independent nor group for activity Study teach and improve performance learning (Supriadi, 2017). Source learn what 's around you student varied, however source learning that is used in general Still limited to books text. Interview result with the teacher in one school in Yogyakarta show that source general learning used is book lesson from Education authorities. Effort utilization various object nature in the environment and society as alternative source studying in school not yet lots done. Source learning used by teachers and students dominant in books text (Adi Pasah Kahar, 2018).

Therefore, that is necessary source learning from others to make it fun and enriching knowledge student. Source reference is non- textbooks that contain available material obtain answer or clarity knowledge certain. Presentation material in book reference arranged in a way systematic like that appearance reader can found it with quick and precise. Source reference can give information the basis becomes reference when people try understanding something term or draft general or special. Flipbook is interesting book reference for learning students (Amanullah, 2020). Books used Still not enough clearly describe material. Based on independent curriculum, effective learning if focus on understanding solution problem so that can answer problems in the environment and application in life every day.

Flipbook learning media is a tool or method that serves as a bridge to help educators teach subjects beyond traditional printed materials, allowing students to access learning resources anytime and anywhere (Nurwidiyanti & Sari, 2022; Yomaki et al., 2023). It is a form of electronic media that integrates text, video, images, music, animation, and interactive elements to create an engaging learning experience (Nisrina et al., 2022). The unique aspect of flipbook learning materials lies in their ability to capture students' attention, resembling the experience of flipping through a physical book (Sirait et al., 2024). Flipbook learning products are accessible on laptops, comput-

ers, or smartphones through an online web-based learning system.

According to (Prastowo, 2018) that there are several criteria source quality learning among them that is: 1. Economical, which means source Study must customized with allocation of funds and needs used. 2. Practical and simple, is easily accessible and easy used, 3. Characteristic flexible, that is source Study nature stiff and patent but easy developed, can utilized for reach objective learning and not easy influenced by factors other, 4. Relevant with objective learning, 5. Got it help achievement efficiency learning and convenience achievement objective learning. 6. Have mark positive for the process or activity learning student.

The shape no limited is in form prints, videos, devices soft, or combination from several forms that's what can be done used students and teachers. Source you can learn too interpreted as all place or the environment, people, and objects that contain it information that becomes vehicle for student for carry out the change process behavior. For produce good Flipbook, then should load characteristics making Flipbook That alone, with notice things as following: 1. Theme arranged in a way alphabetical or follow something system certain logical ones in a way science, 2. Explanation theme accompanied with Interesting, relevant, and informative images with themes discussed, 3. Theme own level high completeness or very complete, 4. Every theme discussed in a way comprehensive, 5. Entire themes presented consistent with field discussion Flipbook the, and 6. Flipbook be equipped with glossary, index, and bibliography. Agustina (Agustina, 2020) mention that component evaluation Flipbook covers several aspects, as following: 1. Aspect appropriateness content and material 2. Aspect language and readability 3.Aspect appropriateness presentation 4. Aspect implementation and 5. Aspect Graphics.(J. Brown and L. White, 2020)

However, despite the significant potential of flipbooks as an engaging and interactive learning medium, their implementation in science education requires further investigation. The use of flipbooks in science education emphasizes the presentation of scientific concepts in a visual and interactive format, which can help students grasp material often perceived as abstract and challenging (Awaliyah et al., 2023) . In the digital age, technology-based learning methods are essential for capturing students' interest and supporting competency-based curricula that prioritize critical thinking and problem-solving skills (Rahmadani & í, 2024a; Soetomo Surabaya, 2024).

Nonetheless, the use of flipbooks in schools still faces several challenges, particularly related to technological access, teachers' skills in designing and utilizing flipbooks, and measuring their effectiveness on student learning outcomes. Previous research has highlighted the benefits of digital media in education, but there remains a gap in the literature regarding the specific implementation and effectiveness of flipbooks in science education (Rahmadani & í, 2024a)

The implementation of flipbooks in education successfully boosted student engagement. flipbook usage enhances students' reading activities, as reflected in longer reading durations, the number of books read, and improved comprehension. the flipbook they created meets practical criteria, significantly increasing student engagement. The positive reactions from students suggest that they are eager to incorporate flipbooks into their learning activities. Therefore, developing flipbook learning media is essential to enhance student participation. This study aims to create a science flipbook to promote increased student learning activities (J. Lee and K. Smith, 2019; M. Kumar and S. Ali, 2023; R. Adams, 2018; T. White and P. Adams, 2021)

Therefore, a comprehensive analysis is necessary to examine the potential, challenges, and impact of flipbooks as a science learning medium. This article aims to review various studies on the use of flipbooks in science education, including supporting factors, encountered challenges, and the effects of flipbook use on students' conceptual understanding and skills. Through this review, it is hoped to gain a comprehensive understanding of how flipbooks can be effectively implemented in science education and how this medium can be adapted to meet the needs and characteristics of students.

The urgency of conducting the research is to adapt educational methods to the digital era. As technology continues to advance, traditional teaching tools are becoming less effective in engaging students, particularly in science education. The integration of digital media, such as flipbooks, offers an innovative approach to enhance student interaction and understanding of complex scientific concepts. Given the rapid shift towards online and hybrid learning environments, it is crucial to explore how flipbooks, as interactive and multimedia-rich resources, can support student engagement and improve learning outcomes. This research will provide valuable insights into the current state of flipbook implementation in science education, identify its effectiveness, and highlight areas for further de-

velopment. By reviewing existing literature, the study aims to inform educators and policymakers about the potential of flipbooks to transform science teaching in the digital age, ensuring that educational practices remain relevant and effective in meeting the needs of modern learners. The research questions in this aricle are as follow.

RQ 1: How can Implementation Flipbook increase ability participant educate in science learning?

RQ 2: What Difficulty and ease use Flipbook in Science learning?

RQ 3: What is improved from ability participant educate through?

METHOD

This study used review literature systematic with approach analysis engaging content article scientific related to learning media Flipbook on the eye lesson science 2017- 2024. Higgins (Jack, 2019) explains that review systematic library very important for applied. Very inspiring for recognize priority study and see framework conceptual early in the future and level knowledge somebody about decision proper authoritative. For more context extensive, review systematic library aim for sharpen information obtained.

Data used in study This is secondary data. Secondary data use method documentation from existing data, not acquired data from observation direct. This study use source secondary form articles scientific journals reputable ones accessed in the database in Table. Keywords used in search articles in the database and Sinta and scopus is Flipbook on learning science. Search article limited from 2017 to 2024 to 50 articles. Procedure review literature systematic in study This adapt stages data selection from (Moher, 2010) following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (H. Ibda, 2023)

This research on flipbook media implementation in science education in the digital age uses the SLR method to describe the findings and analysis of flipbook media in science education, focusing on aspects such as concepts, features, and their usage. The stages of this SLR method begin by identifying the latest articles relevant to flipbook media in science education on Scopus databases. To facilitate the SLR method, the preferred reporting items for systematic reviews and meta-analyses (PRISMA) technique is applied to carry out the stages of identification, screening, testing feasibility, data inclusion, after which analysis is conducted and presented in the form of descriptive summaries.

Inclusion and Exclusion Criteria of Publication

At this stage, the researcher determined nine criteria for selecting articles. First, the articles must be indexed by Scopus and SINTA. Second, the review was limited to peer-reviewed scientific articles. Other types of literature, such as theses, dissertations, papers, book chapters, conference proceedings, research reports, and books, were excluded. Third, the articles must have been published between 2019 and 2024. Fourth, the articles should focus on flipbook media implementation in science education. Fifth, the search for articles was conducted exclusively using the Publish or Perish 7 application, which facilitates the retrieval of Scopus- and SINTA-indexed articles by incorporating an API key into the application. Sixth, only articles from Scopus-indexed open-access journals were included, while those from closed-access journals were excluded unless they could be downloaded and indexed on platforms such as ResearchGate.net, Academia.edu, Eric.ed.gov, and Issuu.com. Seventh, only articles available in full PDF format were included, while articles requiring additional steps to obtain the full PDF were excluded.

Screening and Eligibility Assessment for Data Analysis

At this stage, a screening of literature findings from Scopus and SINTA was conducted from January 25 to January 29, 2024. The screening process focused on the title, abstract, and keywords of the articles. Various keywords were used to refine the search criteria, ensuring the retrieval of a comprehensive range of articles related to flipbook media implementation in science education.

The results of the article search using the ”Scopus” and ”Sinta” databases reveal a comprehensive focus on the use of ”Flipbook” as a ”digital media” in ”science education.” Eight different ”keywords” were utilized to identify relevant publications, yielding a total of 380 articles. From the ”Sinta” database, the keyword ”Flipbook as media in science education” produced 42 articles, while ”Flipbook implementation in digital science education” resulted in 38 articles. The keyword ”Flipbook media in digital learning era” yielded the highest number of articles in Sinta, totaling 49. In the ”Scopus” database, the search results were more varied. The keyword ”Flipbook media in science education” returned 27 articles,

and "Digital media in science education" generated the largest number of articles across both databases, with 110 entries. Meanwhile, "Flipbook technology in digital education" contributed 15 articles. Additionally, "Science education in digital era using flipbook" and "Flipbook as educational media in the digital age" produced 68 and 31 articles, respectively. The findings demonstrate the significant academic interest in the integration of "Flipbook" as an educational medium in "science education," particularly in the context of the "digital era." The dominance of keywords related to digital education highlights the ongoing transition toward technologically enhanced learning environments.

The findings from the search yielded 380 articles, but not all were selected and reviewed; duplicate articles were removed. In the final stage, 50 articles were selected, imported into the Mendeley application, and saved in RIS format.

PRISMA Flow Diagram

The article search process using the PRISMA flowchart follows four structured schemes: identification, screening, eligibility, and inclusion. These four schemes were implemented to obtain articles relevant to the research theme.

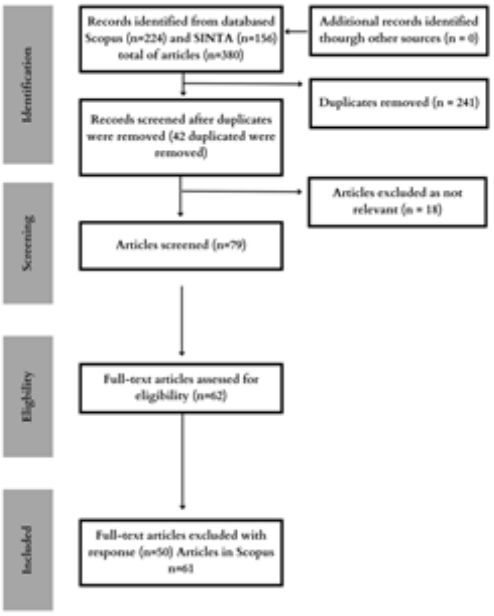

Figure 1. Prisma Flow Diagram for Systematic Literature Review

RESULT AND DISCUSSION

The results of the study show that the use of flipbook media in science learning significantly increases student engagement and understanding. Data analysis reveals a substantial improvement in science concept comprehension among students, as compared to the control group using conventional media.

Implementation Flipbook Increase Ability Participant Educate in Science Learning

That interactive digital media use can enhance learning motivation and students' concept comprehension in science education. The use of flipbooks as a learning medium plays a crucial role in increasing student interest in science material(Anak Agung Meka Maharcika, 2021). This is due to the visualization of content in the form of images, animations, and interactive features that make the learning process more engaging and less monotonous(Mahendri et al., 2022; Purwowidodo, 2023).

This visualization helps students conceptualize abstract material, thereby facilitating a deeper understanding of concepts. Another study supports this, with(Purwowidodo, 2023) stating that flipbooks can enhance students' retention of complex science material. Furthermore, students using flipbooks were more active in the learning process, as shown in the analysis of student engagement in classes utilizing flipbook media. This is because flipbooks feature navigation options that allow students to revisit material they have not fully understood, without relying entirely on the teacher's explanations an advantage in self-directed learning (Rahmadani & í, 2024).

Frequency of Articles in Each Year

The chart illustrates the frequency of articles published from 2017 to 2024 provides insights into the evolving interest in digital flipbooks as an educational tool within science education. This upward trend suggests a significant increase in scholarly attention toward this technology, which may correlate with the broader adoption of digital resources in educational settings, particularly as institutions worldwide embrace the digital transformation of education.

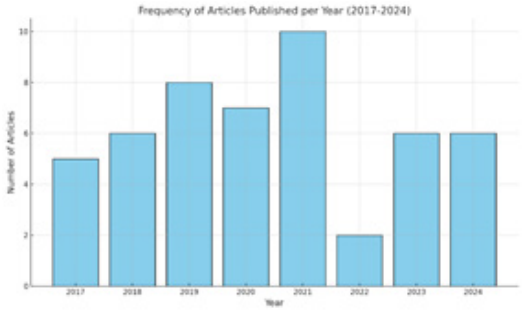

Figure 2. Frequency of Articles Published per Year

The graph shows a gradual increase in publications over the years, beginning with relatively few articles in 2017 and culminating in a notable peak by 2024. This trend likely reflects a growing awareness of the potential benefits of digital flipbooks for engaging students in science. The increase aligns with advancements in educational technology, which have enhanced the accessibility and versatility of digital flipbooks as interactive learning tools.(Çebi, 2020; Guillén-Gámez, 2021)

The consistent rise in publications from 2019 onwards may also be influenced by global shifts toward digital learning environments, accelerated by events such as the COVID-19 pandemic. During this period, educators and researchers explored various digital solutions to overcome physical classroom restrictions, with flipbooks offering a unique, interactive approach to presenting complex scientific concepts (Alberth, 2018). The graph's peak in the final years suggests that digital flipbooks have become an increasingly popular subject of academic inquiry, driven by the need for effective remote and hybrid learning tools (M. Kumar and S. Ali, 2023; S. Kumar and R. Ali, 2023).

The data also highlights a trend toward more visual and interactive resources in education, especially in STEM fields, where conceptual understanding can benefit from dynamic and visually engaging tools. The rising frequency of research on flipbooks indicates that educators are actively seeking methods that cater to diverse learning preferences and improve engagement through interactivity, which is well-supported by digital flipbook capabilities (Belmonte, 2019; Marjuah, 2023)

The growth in article frequency suggests a promising area for further exploration, particularly in assessing the long-term impacts of digital flipbooks on learning outcomes. As research interest has consistently increased, future studies could focus on optimizing flipbook content, evaluating their effectiveness across various science topics, and exploring the challenges of implementing such technology in classrooms with limited resources (Lockee, 2021; Tømte, 2017).

Distribution of Flipbook at Each Level of Education

The pie chart above illustrates the distribution of flipbook usage across different educational levels. The largest portion of flipbook usage is observed at the high school level, which accounts for 37% of the total distribution.

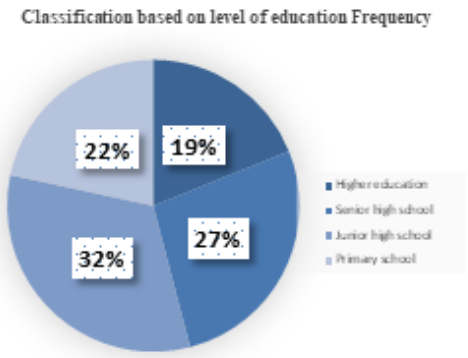

Figure 3. Classification Based on Level of Education Frequency

This is followed by elementary schools (Sekolah Dasar) with 27%, and junior high schools (Sekolah Menengah Pertama) with 23%. The lowest percentage of usage is at the university level, comprising only 13% of the total distribution. This data suggests that flipbooks are most commonly utilized in high school education, potentially due to the complexity and volume of content that benefits from digital support at this level. Meanwhile, the relatively lower usage in universities might indicate a preference for other educational resources or methods at that stage.

Difficulty and Ease Use Flipbook in Science Learning

Difficulty and ease use Flipbook in Science learning. The implementation of digital flipbooks in science education presents a unique blend of challenges and benefits that impact both educators and students. As digital tools gain traction in educational settings, it is essential to understand the specific factors that contribute to the usability of flipbooks, as well as the barriers that can hinder their effective application. Ease of Use in Enhancing Engagement and Understanding

Digital flipbooks provide interactive elements, such as animations and embedded quizzes, that support science students in visualizing complex processes. These features cater to diverse learning styles and promote engagement, which is particularly beneficial in topics like cellular biology and physics, where abstract concepts are more challenging to grasp (M. Brown, 2020). Students using flipbooks demonstrated greater conceptual understanding and retention due to the dynamic, visual presentation of content (A. Juul and M. Petersen, 2021). Moreover, because flipbooks allow self-paced exploration, they align well with student-centered learning models,

which are central to modern science education practices (J. Lee and K. Smith, 2019). Challenges with Digital Proficiency and Technical Access Despite these benefits, using flipbooks effectively requires a certain level of digital literacy among educators. A study by Lee and Smith (R. Adams, 2018) found that teachers unfamiliar with digital tools faced significant difficulties in integrating flipbooks into their lesson plans. Technical issues, such as device compatibility and software glitches, are additional challenges that can disrupt the learning experience, particularly in schools with limited technological resources (T. Norris, 2022).Furthermore, researchers like Adams et al. (M. Kumar and S. Ali, 2023)have noted that the transition to digital learning tools often demands training programs to help educators overcome these technological barriers.

The success of flipbooks in science education is also contingent upon access to adequate technology. In low-resource settings, where access to computers or tablets may be limited, students may struggle to fully utilize flipbooks (J. Brown and L. White, 2020). According to Brown and White (J. Brown and L. White, 2020; M. Brown, 2020), such disparities can exacerbate the digital divide, impacting students' overall learning experience. These infrastructural constraints make it difficult for schools in certain regions to implement flipbooks effectively and equitably.

One of the significant advantages of flipbooks is their adaptability. Educators can customize flipbook content to align with specific learning objectives, adjusting the complexity of information to suit different educational levels (J. Brown and L. White, 2020).

This flexibility makes flipbooks a valuable resource for differentiated instruction, allowing students to access information suited to their individual learning pace and ability (M. Brown, 2020; R. Adams, 2018). Additionally, flipbooks can be updated easily, ensuring that the content remains relevant and aligned with the evolving curriculum standards (J. Lee and K. Smith, 2019). However, while interactive elements in flipbooks are beneficial, they may also lead to cognitive overload if not designed thoughtfully. Kumar and Ali(Kumar, 2020; M. Kumar and S. Ali, 2023; S. Kumar and R. Ali, 2023) suggest that excessive multimedia content or overly complex navigation (Awaliyah et al., 2023)istract students, especially younger ones, from the core learning objectives. Striking a balance between engaging features and clarity of content is thus essential for maximizing the educational value of flipbooks in science learning.

Development of Flipbook improved from ability participant educate through

Flipbook Related Variables in Science Learning Through Developed Flipbook science literacy (Haryanto et al., 2023; Lestari et al., 2024; Nashir & Winarsih, 2020; Oronce & Andrew Manalo, 2021; Puspita Sari & Nisa, 2024; Solikhatun & Widihastrini, 2018; Taufik & Arif Widagdo, 2024; University et al., n.d.;Yulyanti et al., 2022); Science Process skills (Awaliyah et al., 2023; Dinda Desma Romadona et al., 2021); interest in learning (Hasanah & Sari, 2024); Learning outcomes (Cahya & Bektiningsih, 2024; Dalimunthe et al., 2022; Hardiansyah & Mulyadi, 2022); Science learning motivation (Setianingrum et al., 2022); Environmental Care Attitude (Azhary et al., 2020; Devitasari et al., 2021); Critical Thinking (Doyan et al., 2024); mastery of science concepts (Nisa, 2022); Scientific literacy (Aji et al., 2022);(Hartomo & Sukmawati, 2024); (Armani et al., 2021); Problem solving (Arifah et al., 2022; Santoso & Rahman, 2024); creative thinking (Fitri Fatimah et al., 2024); Motivation (Made Eka Adnyana, 2023); Collaboration (Andini et al., 2023; Handayani et al., & Hakim Purnamasari, 2023; Kusuma et al., Novianti et al., Putri & Kurniawan, 2024); Digital Literacy (Pratama & Sari, 2023; Rizki & Nugroho, 2023; Fadhila & Lestari, 2023; Saputra & Hartono, 2024; Santoso & Rahman, 2024; Wahyuningsih et al., 2024; Rahmadani et al., 2024).

The development of flipbooks as a digital learning medium has demonstrated significant improvements in student learning outcomes, particularly in science education. Flipbooks integrate various multimedia elements, such as text, images, animations, and videos, making the learning process more interactive and engaging. These visual and interactive features help bridge the gap between theoretical knowledge and practical understanding, allowing students to better grasp complex scientific concepts (Guillén-Gámez et al., 2021).

In the digital age, flipbooks have emerged as an innovative learning medium to enhance the quality of science education. Based on a systematic literature review, various types of materials are used in the development of flipbooks for science learning, covering topics in biology, physics, chemistry, and environmental science. These materials are tailored to meet educational needs and student levels.

In biology, topics such as the excretory system (Solikhatun & Widihastrini, 2018), animal life cycles (Hardiansyah & Mulyadi, 2022), respiratory systems (Setianingrum et al., 2022),

photosynthesis (Andini et al., 2023), and metabolism (Made Eka Adnyana, 2023) are the main focus. Flipbooks are employed to help students grasp complex biological concepts through visual and interactive approaches. In physics, commonly used materials include force and pressure (Hasanah & Sari, 2024), thermodynamics (Doyan et al., 2024; Lestari & Wijaya, 2023), wave phenomena (Pratama & Sari, 2023), and gravity (Hakim & Purnamasari, 2023). Flipbooks enable dynamic illustrations to effectively explain physical phenomena. In chemistry, flipbooks are utilized to cover topics such as chemical reactions (Rizki & Nugroho, 2023), the periodic table (Rahmadani et al., 2024), and hydrocarbons (Simatupang, 2021). These tools help students bridge theoretical concepts with practical applications in everyday life. Furthermore, environmental issues are also a significant focus in flipbook development. For example, materials on waste management (Wahyuningsih et al., 2024), environmental changes (Nashir & Winarsih, 2020), and global warming (Santoso & Rahman, 2024) aim to raise students' awareness of sustainability and environmental conservation. Overall, flipbooks as a learning medium offer flexibility in presenting a wide range of science topics in an interactive and engaging format. The combination of relevant materials and digital technology supports more effective learning in the modern era (Haryanto et al., 2023; Kusuma et al., 2024; Putri & Kurniawan, 2024).

The implementation of flipbooks not only enhances student learning but also requires educators to develop strong digital competencies. Teachers need to be proficient in creating and managing flipbooks, utilizing software like FlipHTML5 or Canva to include videos, animations, and interactive quizzes. Research has shown that teachers trained in digital media tools are more effective in engaging students and motivating them to learn (Alberth et al., 2018; Kumar & Ali, 2020).

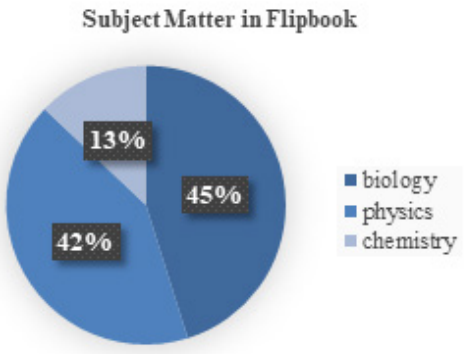

Figure 4. The percentage of subject matter in flipbook

Therefore, ongoing professional development and digital literacy training for teachers are critical components of successful flipbook integration in classrooms. The use of flipbooks as a teaching medium has shown a significant positive impact on student performance. Studies indicate that students who use flipbooks demonstrate better concept understanding and achieve higher scores in assessments compared to those who rely on traditional learning materials (Marjuah et al., 2024). This can be attributed to the interactive nature of flipbooks, which effectively stimulate students' interest and allow them to revisit the content independently for better retention and mastery of the subject matter.

Despite the numerous advantages, the implementation of flipbooks in educational settings also presents certain challenges. One of the main obstacles is the limited access to technology, particularly in regions with insufficient digital infrastructure. Additionally, creating high-quality, curriculum-aligned content for flipbooks requires significant time and effort from educators (Lockee, 2021). To overcome these barriers, continuous teacher training and strong technological support from educational institutions are essential. This would ensure that flipbooks are effectively utilized as a learning tool, enhancing the overall educational experience (Tømte et al., 2015).

CONCLUSION

This article reviews the effectiveness of using Flipbooks as a learning media in science education, covering fields such as Physics, Chemistry, Biology, and related sciences. The study analyzes scientific articles published between 2017 and 2024, showing that Flipbooks enhance students' concept comprehension, engagement, and critical thinking skills. The visualization and interactivity of Flipbooks help simplify abstract concepts, making it easier for students to understand complex material. However, implementing Flipbooks still faces challenges, including limited technology access and teachers' skills in designing Flipbooks. This article highlights the need for further analysis on the potential, barriers, and impact of Flipbooks to support competency-based curricula.

REFERENCES

A. Juul and M. Petersen. (2021). Digital Flipbooks as Learning Aids in Science Education. *International J. Sci. Educ*, 18(3), 55–70.

Adi Pasah Kahar. (2018). Penerapan Bahan Ajar Ekosistem Mangrove Berbasis Potensi Lokal Untuk Meningkatkan Sikap Peduli Lingkungan Siswa. *Didaktika Biologi:Jurnal Penelitian Pendidikan Biologi,* 2(1), 1–8.

Agustina, D. W. , dan F. H. (2020). Pengembangan Flipbook Berbasis Problem Based Learning (PBL) pada Submateri Pencemaran Lingkungan untuk Melatihkan Keterampilan Berpikir Kritis Peserta Didik Kelas X SMA. *Jurnal UNESA*, 9(1), 325–339.

Aji, S. D., Yasa, A. D., Dewi, P. K., Kumala, F. N., & Putri, A. N. (2022). Development of E-Module Flipbook on Science Learning to Support Sustainable Development Goals (SDGs) for Elementary School Students. *QALAMUNA: Jurnal Pendidikan, Sosial, Dan Agama*, 14(2), 895–906. https://doi.org/10.37680/qalamuna.v14i2.3705

Alberth, M. , et al. (2018). Social media for teacher professional development in the digital era. *TEFLIN Journal*, 29(2), 293–306.

Amanullah, M. A. (2020). Pengembangan Media Pembelajaran Flipbook Digital Guna Menunjang Proses Ppembelajaran Di Era Revolusi Industri 4.0. *Special Issue, SEMNASDIKJAR 2019,* 34–44.

Anak Agung Meka Maharcika, N. K. S. & I. M. G. (2021). Pengembangan Modul Elektronik (E-Modul) Berbasis Flipbook Maker. *Jurnal Pendidikan Dasar Indonesia*, 2(5), 165–174.

Arifah, A., Hasruddin, H., & Sumarno, S. (2022). The Effectiveness of Digital Book Learning Media Through the Kvisoft Flipbook Application Based on Problem Solving. *Elementary Science Subjects*. https://doi.org/10.4108/eai.20-9-2022.2324664

Armani, A., Rahmad, M., & Zulhelmi, Z. (2021). Science e-Module Based on Scientific Approach Using Kvisoft Flipbook on Temperature and Heat Materials in Class VII Junior High School. *Jurnal Geliga Sains: Jurnal Pendidikan Fisika*, 9(1), 70. https://doi.org/10.31258/jgs.9.1.70-80

Awaliyah, M., Widodo, W., & Haryono, E. (2023). Development of Flipbooks Based on Guided Inquiry Models to Train Science Process Skills of Junior High School Students on Temperature and Heat Materials. *IJORER : International Journal of Recent Educational Research,* 4(6), 899–908. https://doi.org/10.46245/ijorer.v4i6.407

Azhary, S. A.-G., Suryadarma, I. G. P., Devitasari, P. I., & Kuswanto, K. (2020). Development of Science E-Flipbook Integrated Illegal Sand Mining on River Basin to Improve Environmental Care Attitude. *IJECA (International Journal of Education and Curriculum Application)*, 3(1), 26. https://doi.org/10.31764/ijeca.v3i1.2036

Belmonte, J. L. , S. S. P. , C. M. B. M. , & M. E. L. (2019). Digital competence of future teachers to carry out a process of teaching and learning through virtual reality. *Edutec*, 6(7), 1–15.

Cahya, K. L., & Bektiningsih, K. (2024). Development of Augmented Reality Based Flipbook Media on Natural Science Subject Matter of Ecosystems. *Jurnal Penelitian Pendidikan IPA*, 10(11), 8436–8445. https://doi.org/10.29303/jppipa.v10i11.7630

Çebi, A. , & R. (2020). Digital competence from preservice teachers' perspective. *Journal of New Approaches in Educational Research*, 9(2), 294–308.

Devitasari, P. I., Wilujeng, I., Azhary, S. A., & Sadewo, M. A. I. (2021). The Development of natural science module web integrated with local plants toward cooperation skills and environmental care attitude of students. *Journal of Physics: Conference Series*, 1882(1). https://doi.org/10.1088/1742-6596/1882/1/012094

Dinda Desma Romadona, Sri Purwaningsih, & Darmaji Darmaji. (2021). Validity of static fluid practicum guide based on science process skills using kvisoft flipbook maker. *JSER Journal of Science Education Research Journal*, 5(1), 1–5. www.journal.uny.ac.id/jser

Doyan, A., Wahyudi, Ayub, S., Harjono, A., & Susilawati. (2024). Effectiveness of Thermodynamics Textbooks Assisted by Heyzine Flipbook to Improve Students' Generic Science, Critical Thinking and Conceptual Understanding. *Jurnal Penelitian Pendidikan IPA*, 10(10), 7839–7844. https://doi.org/10.29303/jppipa.v10i10.9091

Fitri Fatimah, N., . S., & Yamtinah, S. (2024). Needs Analysis for the Development of Science e-Modules Assisted with Kvisoft Flipbook Maker on the Basic of Project Based Learning on Heat and Transfer Materials to Improve Creative Thinking Ability in the Pandemic Period. *KnE Social Sciences*. https://doi.org/10.18502/kss.v9i8.15571

Guillén-Gámez, F. D. , M.-F. M. J. , B.-A. J. , & E.-O. D. (2021). Analysis of teachers' pedagogical digital competence: Identification of factors predicting their acquisition. *Technology, Knowledge and Learning*, 26(3), 481–498.

H. Ibda, T. S. W. A. A. A. P. H. and M. M. (2023). Student academic stress during the COVID-19 pandemic: a systematic literature review. *International Journal of Public Health Science (IJPHS)*, 12(1), 286–295.

Hardiansyah, F., & Mulyadi. (2022). Improve Science Learning Outcomes for Elementary School Students Through The Development of Flipbook Media. *Jurnal Penelitian Pendidikan IPA*, 8(6), 3069–3077. https://doi.org/10.29303/jppipa.v8i6.2413

Hartomo, R. M., & Sukmawati, W. (2024). The Effect of Digital Flipbook Media on Improving Science Literacy on Human Digestive System Materials Among Elementary School Students. *Jurnal Penelitian Pendidikan IPA*, 10(9), 6260–6270. https://doi.org/10.29303/jppipa.v10i9.7994

Haryanto, H., Widarti, H. R., Mashfufah, A., Dewi, R. S. I., & Kusumaningrum, S. R. (2023).

Flipbook-Based Project-Based Learning: An Opportunity to Improve Science Literacy. *Jurnal Penelitian Pendidikan IPA*, 10(7), 4004–4009. https://doi.org/10.29303/jppipa.v10i7.7916

Hasanah, Q., & Sari, E. Y. (2024). Development of Flipbook E-Modules of Science for Basic School Students. *Edunesia : Jurnal Ilmiah Pendidikan*, 5(3), 1654–1670. https://doi.org/10.51276/edu.v5i3.1000

J. Brown and L. White. (2020). Addressing the Digital Divide in Flipbook Access. *Journal of Science Education and Technology*, 14(1), 78–85.

J. Lee and K. Smith. (2019). Self-Paced Learning with Digital Flipbooks: An Analysis. *Education Technology*, 15(2), 89–102.

Jack, C. , & H. S. (2019). Embedding educational technologies in early years education. *Research in Learning Technology*, 27(1), 27–1.

Kumar, S. , & A. R. (2020). Managing cognitive load in multimedia learning: The effect of different interactive elements on learners. *Journal of Educational Technology*, 49(2), 215–230.

Lestari, V. R., Khotimah, K., & Iksam, I. (2024). Ekoraya: Biodiversity Flipbook Based on Science Literacy. *JURNAL PENDIDIKAN DASAR NUSANTARA*, 10(1), 63–76. https://doi.org/10.29407/jpdn.v10i1.22799

Lockee, B. B. (2021). Shifting digital, shifting context: (Re)considering teacher professional development for online and blended learning in the COVID-19 era. *Educational Technology Research and Development*, 69(1), 17–30.

M. Brown. (2020). Interactive Tools for Engaging Science Students: The Role of Digital Flipbooks. *J. Educ. Innov*, 12(4), 220–233.

M. Kumar and S. Ali. (2023). Cognitive Load and Multimedia in Science Flipbooks. *Innovative Journal of Curriculum and Educational Technology*, 17(3), 150–160.

Made Eka Adnyana. (2023). Implementation Of Flipbook Learning Media To Improve Motivation And Achievement In Biology Learning In Class XII MIPA2 Students Of Sman 1 Kuta Selatan. *Indonesian Journal of Educational Development (IJED)*, 4(1), 23–31. https://doi.org/10.59672/ijed.v4i1.2764

Mahendri, R. P., Amanda, M., & Latifah, U. (2022). Pengembangan E-Modul Interaktif Berbasis Flipbook sebagai Media Pembelajaran Distance Learning. *J-HyTEL: Journal of Hypermedia & Technology-Enhanced Learning*, 1(1), 1–14. https://doi.org/10.58536/j-hytel.v1i1.18

Marjuah, H. , et al. (2023). Enhancing competency of Islamic education teachers through digital media. *Jurnal Pendidikan Islam*, 5(1), 25–38.

Moher, D. , L. A. , T. J. , A. D. G. , & P. G. (2010). referred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *International Journal of Surgery (London, England)*, 8(5), 336–341.

Nashir, B. M., & Winarsih. (2020). DEVELOPMENT E-BOOK OF FLIPBOOK TYPE ON ENVIRONMENTAL CHANGE MATERIAL TO TRAIN SCIENCE LITERACY GRADE X HIGH SCHOOL (Vol. 9, Issue 3).

Nisa, W. M. (2022). Does an Android-Based Interactive Flipbook Affect the 2nd Grade Junior High School Student's Science Concept Mastery? *114 JSER Journal of Science Education Research Journal*, 6(2), 114–119. www.journal.uny.ac.id/jser

Oronce, J. P., & Andrew Manalo, D. O. (2021). Development and Validation of Flipbook in Earth and Life Science. *In IOER INTERNATIONAL MULTIDISCIPLINARY RESEARCH JOURNAL* (Vol. 3, Issue 1).

Prastowo, A. (2018). *Sumber Belajar & Pusat Sumber Belajar.* Prenadamedia Grup.

Purwowidodo, A. (2023). M-Learning-E-Book: Higher Level Thinking Skills, Retention, Motivation of Junior High School Students. http://journal.iaimnumetrolampung.ac.id/index.php/ji/

Puspita Sari, I., & Nisa, K. (2024). The Effectiveness of Using Flipbook-Based E-Modules in Science Learning in Elementary Schools. *International Journal of Recent Educational Research*, 5(6). https://doi.org/10.46245/ijorer.v5i6.615

R. Adams, P. L. and T. W. (2018). Challenges in Integrating Flipbooks into Science Classrooms. *Journal of Science Education and Technology*, 11(5), 120–130.

Rahmadani, E., & í, B. (2024). Innovation of Flipbook Teaching Materials in Supporting Student Learning Independence. *Jurnal Pendidikan*. 11(1), 176–189. https://doi.org/10.53400/mimbar-sd.v11i1.61620

Rahmawati, Y., & Trie Kurniawan, D. (2022). The Development of Flipbook Based on the Addie Model in Science Learning for Elementary School Students. *In International Journal of Learning and Instruction (IJLI)* (Vol. 4). www.canva.com

S. Kumar and R. Ali. (2023). Interactive Features and Cognitive Overload in Digital Learning Tools,. *International Journal of Media and Information Literacy*, 16(3), 135–145.

Setianingrum*, D. A., Ula, E. M., Pratiwi, S., & Jumadi, J. (2022). Development of LKPD with a Contextual Approach Based on Flipbook to Increase Science Learning Motivation. *Jurnal Pendidikan Sains Indonesia*, 10(4), 833–848. https://doi.org/10.24815/jpsi.v10i4.26098

Soetomo Surabaya, U. (2024). The Effectiveness of Project-Based Learning Assisted by Digital Technology to Improve Problem-Solving and Critical Thinking Skills in SMKN 3 Sampang Students Mabrur, Nuril Huda, Sri Utami. *In Journal of Indonesian Social Sciences ,* 5(9). http://jiss.publikasiindonesia.id/

Solikhatun, R., & Widihastrini, F. (2018). The Development Of Interactive Flipbook-Formed Teaching Material To Improve The Of Grade 4 Students' Social Science Learning Outcomes. *Journal of Elementary School Teacher*, 2, 83–89.

Supriadi, S. (2017). Utilization of Learning Resourc-

es in the Learning Process. *Lantanida Journal*, 3(2), 127.

T. Norris. (2022). Navigating Technical Barriers in Digital Learning. *Educational Media International*, 9(2), 97–105.

T. White and P. Adams. (2021). Benefits of Customizable Flipbooks in Science Education. *Journal of Innovation in Educational and Cultural Research,* 13(4), 210–220.

Taufik, A., & Arif Widagdo. (2024). Interactive Learning Media: Bilingual Science Flipbook For Solar System. *Jurnal Penelitian Pendidikan IPA,* 10(9), 7060–7066. https://doi.org/10.29303/jppipa.v10i9.7710

Tømte, C. E. , E. A.-B. , B. U. , & K. A. (2017). Educating online student teachers to master professional digital competence: The TPACK framework goes online. *Computers and Education*, 8(4), 26–35.

University, H., Khaldun, I., Zainal, I., & Arief, A. (n.d.). Development of Problem-Based Learning (PBL) Based Flipbook Media on Science Learning Atsdit Ar-Rohmaniyah, Bogor City. *International Journal on Engineering, Science and Technology*, 4, 2022.

Yulyanti, E., Maftukhin, A., & Akhdinirwanto, R. W. (2022). Development of Ethnoscience-Based Physics E-Module Using Kvisoft Flipbook Maker To Improve Students' Science Literacy Skills. 7(2). http://jurnalkonstan.ac.id/index.php/jurnal