The Effectiveness of E-Book in Learning Process: A Systematic Literature Review

Ni Made Suriani
Ganesha University of Education, Singaraja, Indonesia
Corresponding author email: made.suriani@undiksha.ac.id

Ketut Agustini
Ganesha University of Education, Singaraja, Indonesia

I Gde Wawan Sudhata
Ganesha University of Education, Singaraja, Indonesia

Gede Rasben Dantes
Ganesha University of Education, Singaraja, Indonesia

Abstract---This study aims to analyze the effectiveness of e-books in the last three years and to analyze what types of e-books are most appropriate for current learning. The methodology used is based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). Articles related to the use of e-books from 2020-2022 were searched through the published or perish article search application that focuses on Scopus-indexed articles. The results obtained indicate that the existence of e-books is still widely used to support students to obtain even better learning outcomes. Although several studies have found no significant difference between the use of e-books and regular printed books, the results also show that e-book users got higher learning outcomes. For now, the use of interactive e-books is the most effective e-book of other types, considering that this type of e-book has been tested on users of various ages and different educational backgrounds, with different subjects and different places of implementation.
Keywords---e-book, effectiveness, interactive e-book, learning.

Introduction

Education in the current era of globalization cannot be separated from technological developments. There is a need to continue to explore knowledge in various fields and make it easier to learn, making the role of technology more and more needed in the field of education (Perdana et al., 2021). Even though the technology is the result of scientific developments, the existence of both supports one another.

One of the technologies created to assist the learning process is e-books or digital books. E-books can be defined as reading texts that are available in digital format and can be read through electronic devices (Wexelbaum et al., 2011). E-books were first published to the public in the 1990s and it was only in 1998 that they began to be widely accepted and used (Yalman, 2015). This technology is designed to add features that are not owned by printed books in general (Siegenthaler et al., 2010) in (Almekhlafi, 2020).

Currently, e-books are not only designed in the form of electronic text but have been developed into several types of e-books with additional features which not only support reading skills but also listening skills in the form of audio-e-books. Apart from that, interactive e-books have also been developed which can be linked to other supporting applications, such as videos and quizzes (Zarzour et al., 2020; Yang et al., 2022).

In general, e-books are created to help someone learn. However, several things are still being discussed regarding the effectiveness of using e-books in the learning process. To analyze this effectiveness, a systematic review was

carried out of the literature relating to the effectiveness of e-books in the last three years, from 2020-2022. In addition, the existence of new types of e-books will also be analyzed to see which types of e-books are most effectively used to assist students in the learning process (Roskos et al., 2017; Tang, 2021).

Research Problem

The formulation of the problem from the background above is as follows.
1) Is the use of e-books still effective in the past three years (2020-2022)?
2) What types of e-books are most effectively used in the learning process?

Method

This systematic review was conducted based on the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) (Susilawati et al., 2022). Articles related to the use of e-books from 2020-2022 are searched through Publish or Perish applications that focused on Scopus-indexed articles. The search is done by searching the title word " e-book " with 200 articles as search results. Then the articles were narrowed down with additional title words to become the " e-book effect " with the remaining search results being 27 articles. After that, it was narrowed again to fit the topic of discussion in the field of education into 10 research articles related to the effectiveness of e-books in education. The 10 articles obtained after a deeper look and met the criteria for the articles reviewed were:

1) Articles on the topic of e-books
2) Contains the results of research on the effectiveness of the e-book
3) Effectiveness in the field of education

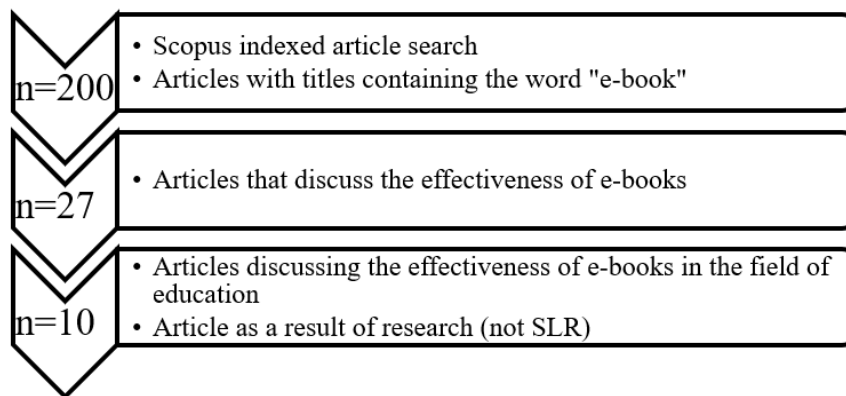The flow and results of searching for articles reviewed in this paper can be seen in Figure 1 below.

Figure 1. PRISMA flowchart for article search

Result and Discussion

Result

After getting the articles which are suitable for the study, the review of each article can be seen in Table 1 below.

Table 1
Article review

Title and Author	Objective	Method	Results	Participant
The effect of E-books on Preservice student teachers' achievements and perceptions in the United Arab Emirates (Almekhlafi, AG)	Investigate the influence between interactive e-books, non-interactive e-books and printed books on learning technology content and assess prospective teacher perceptions of the usefulness of e-books for their learning.	Quasi-experimental, three-group pretest-post-test design	There is no significant difference in the achievement of course content related to the type of book used (interactive e-book / non-interactive e-book / printed book). With an average value of interactive e-book users higher than non-interactive e-books and printed books. Teacher candidates had significantly more positive attitudes toward the usefulness of the interactive e-book version for content learning than the other versions and reported more advantages and fewer disadvantages of the interactive version than the other versions.	Student teacher candidates studying an instructional technology course at the University of the United Arab Emirates
E-book, Audio-Book, or E-Audio-Book: The Effects of Multiple Modalities on EFL Comprehension (Kim, NY)	Explore the effects of e-books and audio-books on EFL listening and reading comprehension	Quantitative pre-test post-test design	Providing audio recordings with identically written text led to a more positive effect on EFL listening comprehension than providing text or audio alone. Regarding reading comprehension, the audiobook group scored significantly lower than the ebook and audiobook group. Regarding listening comprehension, the group comparison results from this study found a superior effect of the concomitant use of an e-book and an audio-book over the single use of an e-book or audio-book, as has been noted by previous scholars.	75 students in Korea
Effect of an interactive e-book on nursing students' electrocardiogram-related learning achievement: A quasi-experimental design (Liu, Y., Chou, PL, Lee, BO)	Design and develop an interactive e-book focused on ECG based on motivational models of attention, relevance, confidence, and satisfaction, and to evaluate the effects of this interactive e-book on learning achievement related to ECG of nursing students	Quasi-experimental post-test only design	Students who use interactive e-books obtain learning effects similar to students who use traditional teaching materials. However, students who use e-books learn more efficiently, especially in understanding complex EKG concepts. Other positive impacts are also related to higher learning motivation, independent learning, and student achievement.	59 senior nursing students
Effects of Students Attitudes towards Using E-books on	Knowing students' attitudes towards e-book use, and their	A correlational descriptive approach was	Students are willing to use e-books because they contribute to making subjects more interesting and	200 students of different genders and universities

Their Self-efficacy and Academic Motivation (ElAd, A., Musawi, AA)	relationship with self-efficacy and academic motivation in Oman universities.	adopted using attitude, academic motivation and self-efficacy scales	enjoyable, and allow students to study anytime and anywhere. The use of e-books generally leads to a significant positive correlation with student self-efficacy and learning motivation.	and academic years.
Effects of the application of information technology to e-book learning on learning motivation and effectiveness (Sun, L., Pan, CE)	e-book learning on motivation and learning effectiveness	Experimental design	(1) the application of information technology in teaching e-books can increase students' sense of accomplishment in independent learning, and students can answer exam questions confidentially and relaxed (2) the application of information technology in ebook teaching enables teaching flexibility, and many teaching models. (3) the application of information technology to teaching e-books bridges the gap between instructors and students and leads to a deeper understanding of students' learning conditions, expanding the possibilities of content planning and teaching models	232 students in Fujian Province
Investigating the Effects of Interactive E-book towards Academic Achievement (Lim, BCY, Liu, LWL, Choo, CH)	Testing the effect of interactive e-books on academic achievement compared to regular e-books	Quasi-experimental and post-test-only control group design	Students who study statistics through IE (interactive e-book) produce higher academic achievement scores than students who learn through TE (traditional e-book).	Students studying statistics
The Effectiveness of eBooks versus Printed Books in the Rural Schools in Indonesia at the Modern Learning Era (Santoso, TNB, Siswandari, Sawiji, H.)	Testing the use of eBooks and printed books in out-of-town schools	Quantitative approach, using the General Linear Model (GML) through Univariate analysis techniques	The results of the study show that there is an influence of teaching materials on student learning outcomes. Students who use e-books show higher results compared to students who use printed books. This study found that rural schools also experienced the impact of the digitalization era in the modern learning era, as evidenced by the higher effectiveness of using eBooks compared to using printed books.	64 vocational students in the Banyudono area, Boyolali
Interactive e-book reading vs. paper-based reading: Comparing the effects of different mediums on middle school students'	Comparing the effects of two different reading media, namely reading interactive e-books and reading paper-based books on students' reading	Quantitative pre-test post-test design	Showed no statistical difference between groups across the five tests. Analysis of literal and inferential questions also showed insignificant differences overall. It was also found that interactive features that are not designed to help	30 high school English students in Korea

reading comprehension (Lim, J.; Whitehead, GEK; Choi, Y.)	comprehension.		students' understanding can distract students from reading assignments which can hamper their understanding. The overall results of this study suggest that it may not be the reading media, but how students engage with each medium that can influence their understanding of the text.	
The Effect of E-books on Young EFL Leaners' Vocabulary Acquisition and Parents' Perceptions of E-books (Lee, S. & Choi, YD)	Testing the effect of reading e-books independently compared to listening to adults reading textbooks aloud, on young Korean learners' vocabulary acquisition and parents' perceptions of e-books and textbooks as vocabulary learning tools for their children, in an EFL context.	Pre-test post-test design, Exploratory data analysis	Both reading methods have a positive effect on learning the vocabulary of languages learned at different levels. Analysis of survey responses indicates that parents find the two media of reading useful for different reasons. They suggested incorporating additional features into the e-book to better assist their children in learning the vocabulary of the language being studied.	19 EFL students in Korea and 128 parents
Effect of interactive multimedia e-books on lower-secondary school students' curiosity in a Science course (Herianto, Wilujeng, I.; Lestari, DP)	Test the effect of use e-book about the curiosity of junior high school students in science subjects	Quasi-experimental, quantitative descriptive design	The results of the independent sample t-test showed that there was a significant difference in students' curiosity between students who used interactive multimedia e-books and students who used textbooks. There was also a significant increase in students' curiosity in science subjects after using interactive multimedia e-books. While students who use print media textbooks did not experience a significant increase in curiosity.	64 students (12 to 14 years old) at a Public Middle School in the city of Yogyakarta

Discussion

When viewed from the results of research regarding the use of e-books in the learning process, e-books are fairly capable of accommodating a variety of varied subjects (Pittet et al., 2000; Rutter & Maughan, 2002). Not only for language lessons, both specifically to help students improve language skills, such as reading and listening (Kim, 2021; Lim et al., 2021; Lee & Choi, 2022), but also to help students study technology subjects (Almekhlafi, 2021); nursing (Liu et al., 2020), mathematics (Zhao et al., 2021), and natural sciences (Wilujeng & Lestari, 2022).

In addition, the users of e-books from the results of the research articles above are also quite varied. E-books are not only used by middle and upper-level students (students) but can also be used by children who are at the elementary level (young learners). (Lee & Choi, 2022). The use of e-book variations in the reviewed articles can be seen in the graph below.
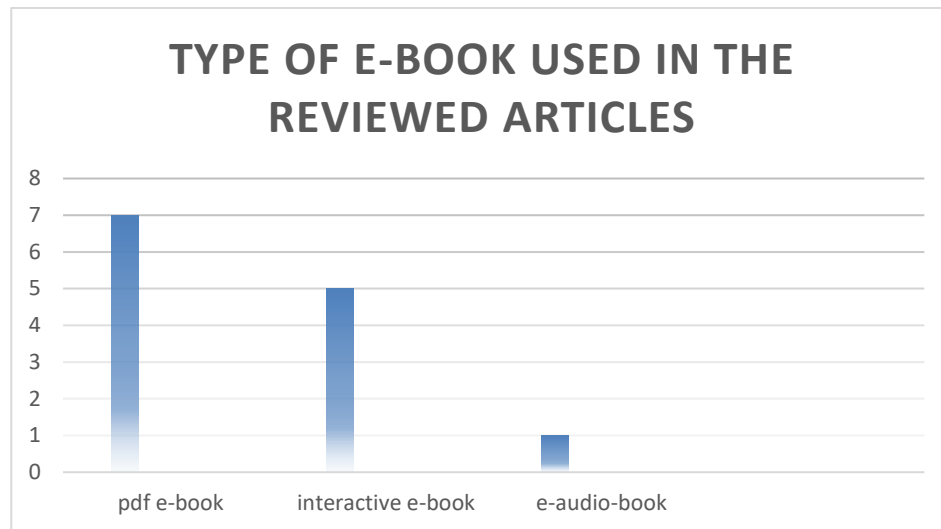
Figure 1. Variations in the types of e-books studied in the reviewed articles

E-book effectiveness in learning

From 2020 to 2022, there are several studies which find that e-books are still more effective for improving student learning outcomes than using only printed books (Liu et al., 2020; ElAdl & Musawi, 2020). E-books are still an option because of the advantages found in using e-books such as being able to encourage more independent learning, being able to provide flexible learning (place and time) and being able to reduce the distance between teachers and students (Sun & Pan, 2021). Although many studies have found that student learning achievement is not significantly increasing, by using e-books students have more interest in learning or motivation to learn about new material in a subject. As found in a study entitled The Effect of E-books on Preservice student teachers' Achievements and Perceptions in the United Arab Emirates (Almekhlafi, 2021) shows that the results of using e-books are not significant but still provide positive feelings for users (prospective teachers) seen from the ease of use, the presence of interesting multimedia elements and also being felt to be more interactive.

However, it is also necessary to pay close attention to the features of e-books which can sometimes interfere with students' concentration, especially when reading and practising their reading comprehension, as found in a study entitled Interactive e-book reading vs. paper-based reading: Comparing the effects of different mediums on middle school students' reading comprehension (Lim et al., 2021), who stated that the features in the e-book that were not needed instead brought distraction to students' concentration when reading interactive e-books.

The most effective type of e-book

When viewed from the results of previous research related to the use of e-books, four types of e-books have been developed and tested over the past 3 years, namely interactive e-books with the addition of games (gamified e-books), interactive e-books, e-audio-books, and non-interactive e-books in pdf format (Egert et al., 2022; Turel et al., 2018).

Of these four types, the most popular to test is the use of interactive e-books and also non-interactive e-book in pdf format (five out of ten studies test interactive e-books and seven out of ten use regular e-books). The results of studies find that the use of interactive e-books is more profitable than non-interactive e-books in terms of increasing students' motivation or desire to learn (ElAdl & Musawi, 2020; Wilujeng & Lestari, 2022). Apart from helping to increase student motivation and curiosity, interactive e-books are also considered to be more efficient in providing clarity on material, because students are not only presented with explanations via text but also with images and even videos linked in the e-book. So that the imagination of students is also used and facilitated by the existence of animations that explain complex material to be simpler (Liu et al., 2020). These findings are supported by the fact that non-interactive e-books only have a slight difference from conventional books or print books in the reading medium, that is if e-books are on digital devices while printed books are on paper. So it doesn't have an impact on student learning outcomes and only affects student learning motivation compared to the use of printed books, considering that in this digital era, students use more digital devices in everyday life (Almekhlafi, 2021).

In addition, it is necessary to conduct further research regarding the use of gamified interactive e-books considering that previous research (Zhao et al., 2021) found that e-books with additional games had a better impact on student achievement than interactive e-books. However, it cannot be said that gamified e-books are superior in general because more research still needs to be done in different places, with different users and different subjects, such as interactive e-books which have been tested a lot with different variations.

Conclusion

It can be concluded that the existence of e-books is still widely used to support students to obtain even better learning outcomes. For now, the use of interactive e-books is the most effective e-book of other types, considering that this type of e-book has been tested on users of various ages and different educational backgrounds, with different subjects and different places of implementation. Thus, in general, it can be said that interactive e-books still outperform other e-books in terms of increasing student motivation, the efficiency of explaining the material, and also student learning outcomes.

References

Almekhlafi, A. G. (2021). The effect of E-books on Preservice student teachers' achievement and perceptions in the United Arab Emirates. *Education and Information Technologies*, *26*, 1001-1021.

Egert, F., Cordes, A. K., & Hartig, F. (2022). Can e-books foster child language? Meta-analysis on the effectiveness of e-book interventions in early childhood education and care. *Educational Research Review*, 100472. https://doi.org/10.1016/j.edurev.2022.100472

ElAdl, A., & Musawi, A. A. (2020). Effects of Students Attitudes towards Using E-Books on Their Self-Efficacy and Academic Motivation. *European Journal of Educational Research*, *9*(3), 1167-1176.

Kim, N. Y. (2021). E-Book, Audio-Book, or E-Audio-Book: The Effects of Multiple Modalities on EFL Comprehension. *English Teaching*, *76*(4), 33-52.

Lee, S., & Choi, Y. (2022). The Effect of E-books on Young EFL Leaners' Vocabulary Acquisition and Parents' Perceptions of E-books. *Korean Journal of English Language and Linguistics*, *22*, 593-617.

Lim, J., Whitehead, G. E., & Choi, Y. (2021). Interactive e-book reading vs. paper-based reading: Comparing the effects of different mediums on middle school students' reading comprehension. *System*, *97*, 102434. https://doi.org/10.1016/j.system.2020.102434

Liu, Y., Chou, P., & Lee, B. (2020). Nurse Education Today E ff ect of an interactive e-book on nursing students' electrocardiogram-related learning achievement: A quasi-experimental design. *Nurse Education Today*, *90*(100), 104427.

Perdana, I., Manullang, S. O., & Masri, F. A. (2021). Effectiveness of online Grammarly application in improving academic writing: review of experts experience. *International Journal of Social Sciences*, *4*(1), 122-130. https://doi.org/10.31295/ijss.v4n1.1444

Pittet, D., Hugonnet, S., Harbarth, S., Mourouga, P., Sauvan, V., Touveneau, S., & Perneger, T. V. (2000). Effectiveness of a hospital-wide programme to improve compliance with hand hygiene. *The Lancet*, *356*(9238), 1307-1312. https://doi.org/10.1016/S0140-6736(00)02814-2

Roskos, K., Brueck, J., & Lenhart, L. (2017). An analysis of e-book learning platforms: Affordances, architecture, functionality and analytics. *International Journal of Child-Computer Interaction*, *12*, 37-45. https://doi.org/10.1016/j.ijcci.2017.01.003

Rutter, M., & Maughan, B. (2002). School effectiveness findings 1979–2002. *Journal of school psychology*, *40*(6), 451-475. https://doi.org/10.1016/S0022-4405(02)00124-3

Santoso, T. N. B., Siswandari, S., & Sawiji, H. (2018). The effectiveness of eBook versus printed books in the rural schools in Indonesia at the modern learning era. *International Journal of Educational Research Review*, *3*(4), 77-84.

Siegenthaler, E., Wurtz, P., & Groner, R. (2010). Improving the usability of e-book readers. *Journal of usability studies*, *6*(1), 25-38.

Sun, L., & Pan, C. E. (2021). Effects of the application of information technology to e-book learning on learning motivation and effectiveness. *Frontiers in psychology*, *12*, 752303.

Susilawati, E., Johari, A., Marzal, J., & Anggereini, E. (2022). Effects of Multimedia E-Books and Augmented Reality on Knowledge and Skills of Health Sciences Students: A Systematic Review. *Journal of Client-Centered Nursing Care*, *8*(2), 99-110.

Tang, K. Y. (2021). Paradigm shifts in e-book-supported learning: Evidence from the Web of Science using a co-citation network analysis with an education focus (2010–2019). *Computers & Education*, *175*, 104323. https://doi.org/10.1016/j.compedu.2021.104323

Turel, Y. K., & Sanal, S. O. (2018). The effects of an ARCS based e-book on student's achievement, motivation and anxiety. *Computers & Education*, *127*, 130-140. https://doi.org/10.1016/j.compedu.2018.08.006

Wexelbaum, R. S., Miltenoff, P., & Parault, S. J. (2011). EBooks and reading comprehension: Perspectives of librarians and educators.

Wilujeng, I., & Lestari, D. P. (2022). Effect of interactive multimedia e-books on lower-secondary school students' curiosity in a Science course. *Education and Information Technologies*, *27*(7), 9619-9639.

Yalman, M. (2015). Preservice teachers' views about e-book and their levels of use of e-books. *Procedia-Social and Behavioral Sciences*, *176*, 255-262. https://doi.org/10.1016/j.sbspro.2015.01.469

Yang, D., Xia, C., Collins, P., & Warschauer, M. (2022). The role of bilingual discussion prompts in shared E-book reading. *Computers & Education*, *190*, 104622. https://doi.org/10.1016/j.compedu.2022.104622 https://doi.org/10.1016/j.compedu.2022.104622

Zarzour, H., Bendjaballah, S., & Harirche, H. (2020). Exploring the behavioral patterns of students learning with a Facebook-based e-book approach. *Computers & Education*, *156*, 103957. https://doi.org/10.1016/j.compedu.2020.103957

Zhao, J., Hwang, G. J., Chang, S. C., Yang, Q. F., & Nokkaew, A. (2021). Effects of gamified interactive e-books on students' flipped learning performance, motivation, and meta-cognition tendency in a mathematics course. *Educational Technology Research and Development*, *69*, 3255-3280.