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the Role of e-Books in Learning Physics: Literature Review

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ABSTRACT

Currently the world is entering an era of globalization which is characterized by the utilization of the role of Information and Communication Technology (ICT) in various aspects of life. Advances in Information and Communication Technology (ICT) facilitate access to information for anyone and anywhere, this encourages changes in various aspects of life, one of which is education.Advances in technology that are increasingly developing in the world of education require teachers to be more creative in integrating this technology into learning. One of them is by utilizing electronic teaching materials, such as e-books in learning. E-book stands for "electronic book" referring to a book available in digital format that can be read electronically and contains text or image content for learning.This study aims to analyze the role of e-books in learning Physics.This research was written using a qualitative methodology and data was collected through a literature review approach to national and international journals on the use of e-books in physics learning which were published in the last 10 years through the Sinta, Garuda, Google Scholar, and ScienceDirect databases. The sample used was 39 journal articles. Research shows that e-books can increase students' interest, motivation and enthusiasm in learning, increase independence, learning outcomes, conceptual understanding, problem solving, learning achievement, 4C skills (Communication, Collaboration, Critical Thinking and Creativity Thinking) and increase participant representation students in physics learning. It can be concluded that the use of e-books as an alternative learning material is beneficial for students.

Keywords:*E-book; Learning Physics.*

I. INTRODUCTION

The quality of human resources (HR) of a country can be improved through education [1].Indonesia sets educational goals through Law Number 20 of 2003 which states that national education aims to develop the potential of students to become human beings who believe and fear God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens. This goal explains that education has an important role in developing the potential of students so that students have the character and skills needed to contribute in the global world.[2]

Currently the world is entering the era of globalization[2]which is marked by utilizing the role of Information and Communication Technology (ICT) in various aspects of life. Advances in Information and Communication Technology (ICT) facilitate access to information for anyone and anywhere, this encourages changes in various aspects of life[3]. The development of science and technology is increasingly encouraging efforts to renew the use of technological results in the learning process[4]. Learning success can be achieved through the formation of effective communication between learning components[5].

The use of technology in education can improve the learning experience of students and allow access to a wider range of learning resources. This includes the use of hardware such as computers, tablets and mobile devices, as well as specially designed educational software or applications. The rapid advancement of technology requires teachers to be more creative in designing learning, including physics which is closely related to formulas, and is interrelated between one formula and another.[6]

Physics is a branch of Natural Sciences (IPA) that studies the nature, structure and interactions of matter, energy and natural phenomena through observation, measurement and experimentation. Physics tries to explain natural phenomena using scientifically proven laws, principles and theories[7].Because of the many formulas, physics is considered a science that is difficult for many students to understand[8]. In addition, students' ability

to solve physics problems is still low because they only use equations, memorize formulas, and guess answers without analyzing the questions first. It can also be proven based on PISA data that the achievements of students in Indonesia are still below international standards[1]**.**Based on the science score, it shows that Indonesia is ranked 72 out of 77 countries, so it can be said that the quality of learning physics is still relatively low. This is inseparable from the resources and teaching materials provided during the learning process[9]**.**

The learning process should use a learner-centered approach. Students are placed as active learning subjects and are given the opportunity to develop their interests and potential. However, current learning practices are still teacher-centered and use lectures as the main method, which indicates that the learning resources used for student-centered learning are not optimally used.[10].

In line with the facts found in the field that the teaching materials available in schools have not met the needs of teaching materials and the demands of the 21st century. The teaching materials used have not directly involved students in discovering learning concepts. In addition, teaching materials also have not kept up with the digital era, are not interactive, are less flexible and are not communicative so that students are not interested and are not motivated to take part in learning.[8], [9], [11] .

Teaching materials are essential and vital learning resources needed to study subjects in schools to encourage teacher effectiveness and improve student learning achievement. Teaching materials make learning more interesting and practical. Furthermore, the use of teaching materials in learning allows teachers and students to participate actively and makes learning more effective. Learners can acquire knowledge and skills, build self-confidence, and self-actualize through teaching materials[12]

There are several types of teaching materials including printed and non-printed teaching materials such as teaching materials through sound and sound (audio), and teaching materials through sound/sound and images (audio visual). Teaching materials that are often used by teachers are books. Books can be in printed form or in electronic form which is commonly called an electronic book (E-book). However, printed books are teaching materials that are often used by students. As it is known that printed books require more costs to support or be used in learning at school and outside of school. In line with research conducted by Elvina that teachers still use learning media such as printed books,[13].

Technological advances that are increasingly developing require teachers to be more creative in providing teaching materials. Apart from providing teaching materials to achieve learning objectives, they must be able to attract students' interest and motivate students to understand physics concepts[14]. In this digital era, it is very easy for us to access and use its benefits. One of the benefits in education today is to obtain books that are used in the learning process or what is known as E-books[15]. The use of e-books in the digital era is of course very helpful in making the learning process easily accessible, flexible, and minimally costly to use[16]

*E-books*is an electronic form of a book with features similar to a printed book, including pages that assist the reader such as pronunciation, text highlighting, and hypermedia such as video, animation, and sound[17], [18]created and published via a computer and can be read or accessed via electronic devices such as computers, cell phones, and others[1]. The results of Rockinson's research show that the use of electronic textbooks compared to traditional textbooks shows that students who use electronic textbooks learn to have higher levels of affective and psychomotor learning, and they learn more actively and enjoy it.[19]. With the E-book it will be very helpful in the learning process because it provides the latest variations so that the learning process is not monotonous[20]

This article explains more fully and in detail regarding the role of e-books in learning physics. The author hopes that the results of this study will be used as a reference for further research.

II. METHODS

This type of research is a qualitative descriptive research with the method of literature study or library research (Library Research). The goal of qualitative research is to understand the phenomena that research subjects encounter in many natural settings, such as behavior, perceptions, motivations, and actions in the form of speech and language. Literature study or library research (Library Research) is a research activity carried out using library data collection methods to collect information, read, record and process research data obtained from reference books, similar previous research results, articles, and various journals related to the problem to be researched. This study aims to analyze the role of e-books in learning Physics. This research was written using a qualitative methodology and data was collected through a literature review approach to national and international journals about the use of e-books in physics learning which were published in the last 10 years (2014-2023)

through the Sinta, Garuda, Google Scholar, and ScienceDirect databases. The sample used was 39 journal articles. This method uses how to collect literature study data on Google Scholar with the keywords using E-books in learning physics.

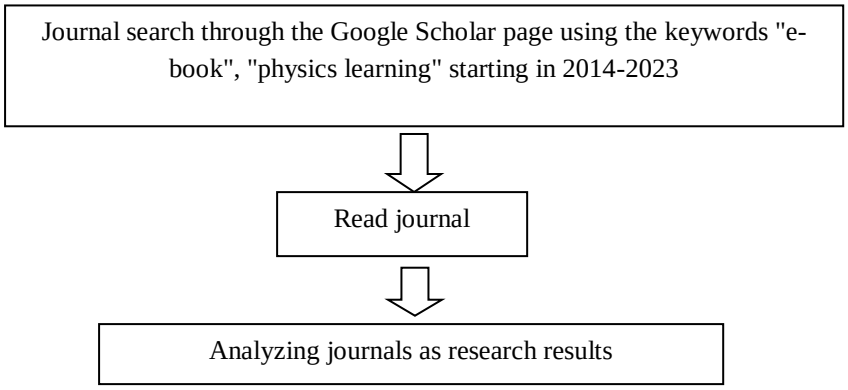

Figure 1. Schematic of the Research Procedure

III. RESULTS AND DISCUSSION

The development of Information and Communication Technology (ICT) has drastically changed the learning paradigm, introducing the digital era where access to information is easier and faster. Even so, several educational institutions are still adopting conventional learning amid the rapid development of technology. Conventional learning has been a method commonly used in education for many years. This method involves teacher-centered learning as the main source of knowledge. Interaction between teachers and students occurs directly in the classroom, with the use of textbooks and printed materials as the main source of learning. This system has been the cornerstone of education for many years, but as technology develops,

The role of the teacher in diverting conventional learning into modern learning in this digital era can be done in various ways, namely applying technology in learning, using various learning methods, encouraging collaboration between students, using additional resources, applying blended learning models and applying a more comprehensive approach. interactive.

Implementation of the 2013 curriculum in the learning process requires students to be more active, creative and innovative in order to acquire life skills independently, intelligently, critically, rationally and creatively, and requires that learning is not limited to studying concepts, theories and facts but also applying these skills. in everyday life. To support this, we need a learning resource in the form of teaching materials, one of which is a book. Books are very important to be used by teachers and students in the learning process to achieve an effective learning process.

Quality learning resources and appropriate teaching materials can influence the success of the learning process. In the learning process, teaching materials have an important role in helping students understand and master the subject matter. Learning materials that are arranged systematically and interestingly can increase the effectiveness of learning and help students achieve predetermined learning goals. There are various types of teaching materials including printed and non-printed teaching materials, such as teaching materials through sound and sound (audio), and teaching materials through sound and images (audio visual).

Teaching materials that are well designed and equipped with interesting content and illustrations will stimulate students to use teaching materials as learning resources. Therefore, teachers must always strive to create and select teaching materials that are relevant, according to the needs of students, and make effective use of technology to improve the quality of learning. One of the teaching materials in accordance with the demands of the 2013 curriculum in the 21st century is an e-book.

*E-books*has several advantages including, firstly accessibility, namely e-books can be accessed digitally via electronic devices such as laptops, tablets, or smartphones. This allows students to access physics learning materials anytime and anywhere as long as they are connected to the internet. Second, portability, namely e-books can be easily carried and stored in electronic devices. Thus, students do not need to carry heavy physical books and large storage space. They can carry physics e-books in one device that is compact and easy to carry anywhere.

The advantage of using the third e-book is that it is interactive, meaning that e-books are often equipped with interactive features such as pictures, videos, animations, and simulations. This feature can help students understand physics concepts better through interesting and interactive visualizations. For example, e-books can present simulations of object motion or virtual experiments that allow students to observe and understand physical phenomena directly. Fourth, easy search and navigation, e-books are usually equipped with a search feature that makes it easier for students to find the information they need. In addition, easy navigation allows students to quickly jump to specific sections in the e-book. Fifth, updates and revisions i.e. e-books can be updated and revised easily without having to reprint the physical version. This allows the teacher to update physics learning materials with the latest information or correct any errors that may exist. Learners can also receive live updates through their e-books.

Finally, the advantage of using e-books is the availability of additional learning resources because e-books can be additional learning resources that complement the physics textbooks used in schools. Students can access e-books with additional material, sample questions, or more in-depth explanations to deepen their understanding of physics concepts[21]–[25]. With some of these advantages, e-books can be effective tools in learning physics, helping students gain a better understanding and increase their involvement in the learning process. Apart from these advantages, e-books also have some disadvantages, such as dependence on internet access, limitations in terms of direct interaction with teachers, and individual preferences for physical or printed learning.

Based on the search results, the use of e-books can help teachers and students in learning physics. Several studies have shown that the use of e-books as a learning resource can increase students' motivation, interest and enthusiasm in learning physics[11], [26], [27]so that it also has an impact on improving student learning outcomes. When students feel interested and enthusiastic about the material, they tend to be more eager to learn and explore deeper physics concepts. In line with the research conducted by Suyatna, it shows that students obtain better learning outcomes by using interactive electronic books than printed books.[10]. The teacher is the creator and facilitator of increasing the ability to understand the concept of subject matter. Interactive and interesting e-books can help students understand physics concepts better and motivate students to learn[28]

The characteristic of e-books is that they allow students to learn independently and not depend on other parties (self-instruction), all the required learning material is contained in the e-book (self-contained), not having to be used together with other teaching materials (stand-alone).) and has a high adaptability to the development of science and technology. In line with research conducted by Levi, et al (2019), Ambarwati, et al (2019), Rika, et al (2019) and Gema, et al (2019) which shows that e-books can help students to study physics material independently and improve their understanding of physics concepts[2], [10], [14], [29]

In addition, the use of e-books also shows various influences on 4C skills (Communication, Collaboration, Critical Thinking, and Creativity) in learning physics[9], [20], [30], [31]. First, Communication (Communication), namely e-books in learning physics can improve students' communication skills. Communication skills refer to the ability to convey ideas and thoughts clearly and effectively. In learning, communication skills can be developed through various activities such as group discussions, presentations, and collaboration with classmates. E-books are often equipped with interactive features, such as discussion forums or comment features, which allow students to communicate with fellow students or teachers about the material being studied. In addition, e-books can also include multimedia content, such as video or audio, which can help in understanding physics concepts more clearly. With these features,

Second, Collaboration (Collaboration), namely e-books can also improve students' collaboration skills. Collaboration refers to the ability to work together, synergize, adapt to multiple roles and responsibilities, and exchange information and resources. In e-books, students can often collaborate with their friends on projects or assignments that are integrated within the e-book platform itself. This collaboration could mean working together on solving exercises, discussing physics concepts, or even creating a project together. This can improve students' cooperative and group thinking skills in the context of learning physics.

Third, Critical Thinking, namely interactive e-books that often have content that challenges students to think critically. Critical thinking is the ability to analyze and evaluate information obtained from observation,

experience, reasoning and communication to decide whether the information can be trusted so that it can provide rational and correct conclusions. With the use of e-books students can be given analytical tasks, reflective questions, or interactive physics games that challenge students to solve physics problems by thinking critically. The use of e-books with such features can stimulate students to develop analytical thinking skills and deal with problems more effectively.[10], [29], [32]–[35].

Fourth, Creativity, e-books provide opportunities for students to be creative with content. Creativity in learning can be interpreted as the ability to find new ways to solve problems or create new ideas that are original and unique. They may be able to take notes, add voice notes or pictures, or create additional content that enhances their personal understanding of physics. With the opportunity to be creative with learning materials, students can express their understanding in a unique and more creative way. Based on research that has been conducted by Zakiyatus, et al (2020), the results of an assessment of e-books show the percentage of validity in the learning aspects, materials, media, language, creative thinking skills each of 90%, 90%, 85%, 90%, 84% with very valid categories for all aspects. The results of this study indicate that e-books are appropriate for use as a medium to improve the creative thinking skills of SMK students on Ohm's Law material[36].

E-books have an important role in increasing multirepresentation in learning physics. Multi-representation in physics learning is an approach that uses various forms of representation, such as text, images, graphics, and animation, to help students understand physics concepts better. In line with the research that has been conducted by Dwi, et al (2019), Resi, et al (2021), Nirmala, et al (2020) and Haryanti, et al (2020) shows that multiple representations in physics learning enable students to gain a better understanding about physics concepts. By using various forms of representation, students can visualize and associate physics concepts with the real world, making it easier for them to understand and remember the information provided. Besides that,[37]–[40].

From the results of this study, it can be concluded that e-books play a very important role in learning physics as teaching materials. Therefore, the use of e-books can be used as one of the teaching materials that are effectively used in learning physics. However, keep in mind that the use of e-books in physics learning must be considered properly and adapted to the needs and preferences of students so that learning objectives can be achieved.

Based on the literature review, it was concluded that e-books have more advantages than disadvantages. The advantages of e-books can be summarized in Table 1.

Table 1. The role of e-books in learning physics

No	**Benefits of Use*e-books* in learning Physics**
1	Increase the interest, motivation and enthusiasm of students in learning
2	Increase the independence of students
3	Improving student learning outcomes
4	Increase students' understanding of concepts
5	Improve problem solving in learning
6	Improving student learning achievement
7	Improve 4C skills (Collaboration, Communication, Critical Thinking and Creativity Thinking)
8	Increase student representation in learning

With the advantages of e-books, it can be a basis for reflection to be used in the learning process to improve the quality of learning. E-books should be used in schools so that learning becomes more effective. Thus, the quality of learning becomes more optimal.

IV. CONCLUSION

*E-books*as teaching materials are very helpful in the learning process. In recent years, the interest of e-book readers has grown significantly from all walks of life. This has a positive impact on students and teachers because of the display and presentation of interactive and multimedia e-books. Several previous studies have shown that e-books play a role in learning physics.

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