Interactive E-book to Improve Student's Problem Solving

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A R T I C L E I N F O

A B S T R A K

Kurangnya sumber belajar berbasis digital membuat siswa mengalami kendala dalam pembelajaran. Hal ini disebabkan karena sumber belajar konvensional kurang praktis sehingga siswa lebih menyukai sumber belajar yang inovatif. Penelitian ini bertujuan untuk menyusun dan menggunakan bahan ajar yang inovatif dan kreatif sesuai dengan kurikulum, perkembangan siswa dan perkembangan teknologi informasi. Penelitian ini tergolong jenis penelitian pengembangan dengan model Dick and Carey. Data penelitian ini dianalisis secara deskriptif kuantitatif. Hasil pengembangan E-book menunjukkan bahwa ini sangat layak digunakan. Skor yang diperoleh 3,8 atau 95% dari validator. Buku elektronik ini juga dinyatakan praktis dengan nilai rata-rata 84,07%. Nilai kepraktisan diketahui dengan melakukan uji coba perorangan, uji coba kelompok besar dan penilaian dari guru. Hasil uji lapangan menunjukan bahwa E-book interaktif yang dikembangkan mampu meningkatkan keterampilan memecahkan masalah pada siswa kelas IV. Setelah diberikan E-book interaktif, nilai siswa secara klasikal meningkat menjadi 92,59%. Berdasarkan hasil penelitian, dapat disimpulkan bahwa E-book ineraktif yang dikembangkan memenuhi standar kelayakan, kepraktisan serta keefektifan untuk digunakan pada siswa kelas IV SD. Implikasi penelitian ini memberikan dampak meningkatkan motivasi siswa dalam belajar sehingga berpengaruh pada hasil belajar siswa yang meningkat.

A B S T R A C T

Lack of digital-based learning resources makes students experience problems in learning. This is because conventional learning resources are less practical so students prefer innovative learning sources. This study aims to compile and use innovative and creative teaching materials by the curriculum, student development, and information technology developments. This research is classified as a development research type with the Dick and Carey model. The research data were analyzed descriptively quantitatively. The results of the E-book development show that it is very feasible to use. The score obtained is 3.8 or 95% from the validator. This e-book is also considered practical with an average value of 84.07%. The practical value is known by conducting individual trials, large group trials, and teacher assessments. The results of the field test showed that the interactive e-book developed was able to improve problem-solving skills in grade IV students. After being given an interactive e-book, the students' scores classically increased to 92.59%. Based on the results of the study, it can be concluded that the interactive e-book developed meets the standards of feasibility, practicality, and effectiveness for use in grade IV SD students. The implication of this research has the impact of increasing student motivation in learning so that it affects student learning outcomes that increase.

1. Introduction

Rapid technological advances have brought changes to the world, especially for the world of education. The rapid advancement of technology is also a motivation for the world of education to change (Andrian & Rusman, 2019; Lubis, 2018). Especially at this time with the Covid-19 pandemic, many things have changed and new problems have emerged. The Covid-19 pandemic has brought various changes in various aspects of life, including education (Dewi, 2020; Fadlilah, 2020). To reduce the spread of the virus,

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almost all public facilities are closed, including schools. Changes in the world of education are felt by both students and teachers. For example, changes in learning patterns that are usually carried out face-to-face have now turned into learning online (online). Designing a meaningful lesson during this pandemic is a very difficult challenge for teachers to realize. Several innovative learning models can be implemented during a pandemic, but children's development adapting to these changes is also a factor that determines the success of the learning process. Currently, teachers are more required to innovate using learning models and media that can facilitate students in learning so that learning objectives will be achieved even though learning through online (Wahyono, Husamah, & Budi, 2020; Wulandari, Sudatha, & Simamora, 2020). Learning designs, learning media, and learning resources that are not by children's development will have an impact on children's low learning achievement.

The problem that occurs today is that the use of ICT as a means of learning is still very low. Various problems that arise include weak student supervision, lack of infrastructure, lack of strong signals for remote areas, and high internet quotas hamper the implementation of online learning (Sadikin & Hamidah, 2020). This problem is experienced by students and teachers in Merauke. Almost no elementary school teachers use digital learning resources in their learning activities. Meanwhile, not only from a practical aspect but also from an environmentally friendly aspect, digital teaching resources can be a consideration for use. Apart from these problems, there are other problems for teachers and students, namely delays in the distribution of printed books, while many teachers view the use of printed books as the main thing. Also, the use of digital learning resources is also very low (Suarsana, 2013; Sugihartini & Laba, 2017). Learning resources should be presented digitally so that students can learn learning materials practically. Online learning requires infrastructure including internet networks and other electronic devices, such as smartphones or laptops (Handarini & Wulandari, 2020; Kuntarto, 2017). The people of Merauke in general are familiar with technology such as the internet. Before the pandemic, several schools were also able to take advantage of the internet network and use computers or projectors, but they were rarely used in learning activities.

Teachers are required to compile and use innovative and creative teaching materials following the curriculum, student development, and information technology developments (Gafur, 2010; Qondias, Winarta, & Siswanto, 2019). Teachers must be more creative in making learning content both through videos and through teaching materials and other media. The rapid development of technology continues to impose demands on teachers to develop practical and flexible learning media. One solution to overcome this problem is the use of digital learning resources in the form of E-books (Arifah, 2017; Pramana, Jampel, & Pudjawan, 2020). E-book teaching materials are known as digital books. E-books can be read digitally on computers, E-book readers, and on cell phones (Astuti & Muslim, 2018). The use of E-books can save paper usage because they can be read on a digital screen. The advantages of E-books include: 1) It is easier to get because it comes from various places, 2) Search for book contents is faster and saves time, 3) Users get many things besides just books, 4) Access to E-books is faster and easier (Awaludin, Wibawa, & Winarsih, 2020; González, Guzmán, Dormido, & Berenguel, 2013). Interactive e-books include reading, pictures, sound, and video and are opened via computers, laptops, cell phones, and other electronic devices (Serevina, Sunaryo, Raihanati, Sari, & Juwita, 2018; Silalahi, 2020).

The e-book is packaged in a single device equipped with color, sound, and music visualization. The characteristics of the E-book are expected to be more attractive, inspiring, interesting, and interactive (Laili, Ganefri, & Usmeldi, 2019; Mawarni & Muhtadi, 2017). In this case, active use of the E-book involves interactions to please and empower students (Arifah, 2017; Astuti & Muslim, 2018). Interactive teaching materials are teaching materials that are innovative, creative, and adaptive to technological advances, creating a sense of pleasure and comfort for students, to make learning more effective and efficient (Husein, Herayanti, & Gunawan, 2017; Pravitasari & Yulianto, 2018). The development of interactive e-books is very suitable in terms of several aspects, namely 1) responding to the demands of the times in terms of ICT, 2) saving and efficient use of natural resources in the form of paper 3) making teaching materials that stimulate learning activities and students' thinking skills, and 4) materials teach fun alternatives for students. An interactive e-book developed according to the E-book criteria of the research by (Puspitasari & Rakhmawati, 2013) which presents material wrapped with sound and motion elements so that the presentation is more attractive. Research conducted by (Monica, Gorghiu, Bîzoi, & Marra, 2011) stated that the E-book as a learning resource can help students in learning because the E-book presents interesting learning material. The use of appropriate learning resources will affect student learning outcomes. Besides that, it will also affect students' critical thinking skills.

Problem solving is the ability to solve problems that have never been encountered without relying on the problem-solving process in general because it can interpret and respond to certain situations effectively (Darmawan, 2010; Mustika & Riastini, 2017). To be able to interpret and respond to situations effectively, critical thinking skills are also important. However, having the ability to think

critically does not necessarily make someone use it in situations where these skills or abilities are needed (Faisal, Nyoto, & Gamaliel Septian, 2018; Gazali, 2017). Basically every human being has the potential to be able to think critically. However, not all humans are able to use critical thinking skills in various situations so that the ability to solve problems is often difficult to obtain. Therefore, it is necessary to improve critical thinking dispositions. A person's personal drive to think critically when faced with a problem that must be resolved, the idea of assessing and making decisions is part of the character of critical thinking (Lieung, 2019). Therefore it is very important to develop a critical thinking character. If critical ink skills are possessed and used properly, of course, the skills in problem-solving will also be better. The steps for solving the problem are 1) analyzing and understanding the problem. At this stage, students can draw and look for more specific case examples. This can be done in an attempt to simply understand a problem; 2) make plans and plans for problem-solving. Plan, determine implementation, means, and expected results; 3) Find a solution to the problem. Determination of interconnected problems. Problem determination and simple modification; 4) Troubleshooting checks. The use of examinations is carried out on certain information and completion stages.

The use of this E-book will stimulate students' problem-solving skills and caring attitude towards the environment. Also, the use of ebooks is more economical and useful for various parties. Some of these advantages include efficiency in terms of allocation of funds, utilization and development of ICT skills as well as participation in environmental conservation efforts, considering that paper is still made from natural materials in the form of wood. This study aims to compile and use innovative and creative teaching materials following the curriculum, student development, and information technology developments. Therefore, the aim of developing this interactive E-book is expected to be a solution to the needs of teachers and students for teaching materials that can hone and improve students' problem-solving abilities.

2. Method

This research is classified as a type of development research. This development research used a design modification of the Dick and Carey model. Development steps with this model are: (1) identification of the general purpose of learning, which aims to gather information about the problems faced by students; (2) learning analysis describes the desired goals achieved by students by reviewing the curriculum used; (3) student analysis and learning context, the context consists of analyzing conditions related to the skills learned by students and student assignments in the application of their knowledge and skills; (4) the formulation of specific learning objectives, carried out specifically so that they can be operationalized so that the level of achievement can be observed and measured using measuring instruments; (5) developing assessment instruments in the form of pretest and posttest; (6) developing learning strategies that aim to improve problem-solving skills; (7) the selection and development of teaching materials, interactive E-book teaching materials are developed with a contextual approach; (8) designing and implementing formative learning evaluations, aiming to assess the results of students' problem solving skills after using the interactive E-book; (9) revision of learning, carried out by revising the draft interactive E-book teaching materials. The data are summarized, analyzed, and interpreted to understand the weaknesses of the draft interactive E-book teaching materials; (10) designing and conducting summative evaluations. However, the Dick and Carey research model is only applied to the ninth stage of the revision of learning. how the data is collected, the source of the data, and how the data is analyzed.

The data in this development research is primary data. The data are in the form of (1) expert validation results, (2) teacher response results to interactive E-book teaching materials, (3) student responses after using interactive E-book teaching materials, (4) implementation results of learning observations, (5) the results of the student problem-solving skills test after using interactive E-book teaching materials. Interactive e-book teaching materials must be tested for feasibility so that they are suitable for use by elementary school students. Assessment of the feasibility of interactive E-book teaching materials is carried out through a series of feasibility tests. The feasibility test of interactive e-book teaching materials consists of expert testing and product use trials that can show the effectiveness of the product being developed. Testing the use of interactive E-book teaching materials consists of individual, small group, and field trials. The research and development data were collected using several techniques, namely questionnaires, and tests.

3. Result and Discussion

The interactive e-book that has been prepared based on the background previously described has been completed. Development is carried out in accordance with the steps according to Dick & Carey, including: 1) the process of identifying learning objectives is generally carried out by analyzing the objectives and realities in the field which indicate that students' problem solving skills are still low afterwards. see the pretest results; 2) analysis of learning in the period before the Covid-19 pandemic and when the pandemic occurred shows an indication that E-books as interactive teaching materials are needed. When a pandemic occurs, students are required to study from home accompanied by their parents. The interdependence of printed teaching materials greatly complicates the learning process. Previously, the problem of slow distribution of printed books could be overcome by conventional explanations from teachers in the classroom. However, during the pandemic, it was difficult for teachers to master classes in the form of online classes assisted by the WhatsApp application. 3) The analysis of students and the context was carried out by giving a pretest before the interactive E-book that was developed was disseminated to students. This was done to see the initial ability of students' problem solving skills. Especially if learning is done through the WhatsApp group. The pretest results become the basis which again reinforces that interactive E-books can be developed. The analysis carried out on students strengthened the information that books equipped with sound elements and pictures or videos containing material explanations were needed by students. The material contained is also adjusted to what is in the student environment in order to make it easier for students to understand the material; 4) The activity of formulating learning objectives aims to formulate learning objectives. Based on the results of the analysis it is known that the learning objectives are not in accordance with the abilities that students want to achieve based on core competencies and basic competencies. The learning objectives to be achieved must be formulated from indicators that are operationally structured; 5) instrument for assessing problem solving skills using a test in the form of a description of 7 questions. The results of the item validity test showed 5 valid items and 2 valid items, and the reliability test stated that the test instruments developed were reliable; 6) developing a learning strategy is done by including video elements in the E-book that is being developed; 7) The interactive e-book was developed using the Page Book Flip version 3.0 application. The making of this interactive e-book was assisted by graphic design in terms of making layouts and icons that appear on the book. The learning videos and pictures are taken from internet sources. Graphic design helps with some items in books such as quizzes and games. An interactive E-book entitled Come Love the Environment! compiled contains 1 theme consisting of 3 sub themes. Each sub-theme contains 2 learning materials. The focus of the material in this E-book is on subject matter in Science, Civics and Indonesian Language. The material in the E-book is adapted to hone problem-solving skills; 8) The design and formative evaluation stages are carried out by assessing the feasibility, practicality and effectiveness of the interactive E-book that has been compiled.

The due diligence stage is carried out by experts so that this interactive E-book is very feasible to use. The score obtained was 3.8 or 95% through the validator's assessment. Furthermore, it is presented in table 1 below.

Table 1. Recapitulation of Interactive E-book Eligibility Values

No	Criteria	Assessment		
		V1	V2	Average
1	Content eligibility	4	3.8	3.9
2	Language Eligibility	4	3.6	3.8
3	Serving Feasibility	3.8	3.8	3.8
4	Graphic Feasibility	3.6	4	3.8
	Total			15.3
	Average			3.8
	Category	**Very Worth**		

Practically speaking, this interactive E-book is also practical with an average value of 84.07%. The practicality value was obtained by conducting individual trials, namely students of class IV-C 3 SD Inpres Polder. Furthermore, the large group trial was 9 different students in class IV-C SD Inpres Polder and also teacher assessments, both in a large group and individual trials. Obstacles that are still being experienced include internet access which is still frequently disrupted.

Through a field test conducted on grade fourth-B students at SD Inpres Polder, it was found that the interactive E-book developed was able to improve students' problem-solving abilities. These results are shown from the comparison of the pretest and posttest results. The completeness standard is 75% with a minimum completeness score of 70. The results of the students' pretest were 55.56% classical

completeness. Meanwhile, after being given an interactive E-book, the students' grades classically increased to 92.59%. Based on the data obtained, the interactive e-book developed meets the standards of feasibility, practicality, and effectiveness for use in grade fourth elementary students. With these results, the developed interactive e-book can be used for online learning in grade fourth elementary students. Teachers can use the E-book as an easy, inexpensive, and effective teaching material. The interactive e-book developed can be used in the learning process due to several factors, namely as follows.

First, the E-book developed is very suitable for use in the learning process because this E-book can increase student activity in learning. The e-book developed can help students learn independently (Kimianti & Prasetyo, 2019; Puspitasari & Rakhmawati, 2013). The advantage of the developed E-book compared to printed learning resources is that it is interactive, making it easier to navigate. This e-book can also display images, audio, and video so that it makes students interested in learning. The e-book developed can facilitate students in learning. Learning resources should be packaged properly and effectively in conveying messages so that they can bridge the information sources with the recipient (students) (Fathoni, Utomo, Hangga, & Pamungkas, 2018; Udayana, Wirawan, & Divayana, 2017). The effectiveness of the E-book that was developed was also achieved because the display on the E-book was presented in a mean with various combinations of text, images, video, and sound. The use of appropriate and attractive colors also has an uplifting effect on students to increase student activity in learning. This is also supported by research conducted by (Purwanita, Riyanto, & Suyanto, 2019) which states the appearance and operation of the product that is easy for students to understand and also pays attention to the principles of multimedia will make it easier for students to learn. The E-book also includes learning objectives to be achieved so that students understand what needs to be achieved which will provide learning directions. The presentation of the material in the E-book also uses communicative sentences that are easy to understand by students, making it easier for students to receive messages.

Second, the E-book developed is very suitable to be used as a learning resource because this E-book can improve students' critical thinking skills. Research conducted by (Irwansyah, Lubab, Farida, & Ramdhani, 2017) and (Perdana, Sarwanto, Sukarmin, & Sujadi, 2017) states that digitally packaged learning resources can increase motivation and critical thinking skills in students when compared to conventional learning so that they are suitable for use in learning. Critical thinking disposition is a tendency to use thinking skills when in certain situations (Hartati, Koto, & Hambali, 2020). That is, he has a good response in using his ability to think and act critically in any situation that is needed. The use of this E-book will stimulate students' problem-solving skills and caring attitude towards the environment. Research conducted by (Wahyuni, 2014) also stated that the development of interactive learning strategies, and the preparation of interactive e-book tools would make it easier for students to understand the material presented in the E-book. Research conducted by (Handaruni Dewanti, Anselmus J E Toenlioe, 2018) stated that E-books can stimulate students to learn because they are presented attractively so that they can have a positive impact on student achievement. It can be concluded that the E-book can make it easier for students to learn so that it affects increased student learning outcomes, and can improve students' problem-solving abilities. The implication of this research has the impact of increasing student motivation in learning so that it affects student learning outcomes that increase.

4. Conclusion

Based on the data obtained, the interactive e-book developed meets the standards of feasibility, practicality, and effectiveness for use in grade IV SD students. With these results, the developed interactive e-book can be used for online learning in grade IV SD. The teacher can use the E-book as a learning material that can improve students' problem-solving abilities.

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