E-Book with A Scientific Approach on Natural Science Lesson For Fifth Grade Students of Elementary School

* Putu Netha Kusumayuni[1], Anak Agung Gede Agung[2]

[1,2] *Universitas Pendidikan Ganesha, Singaraja, Indonesia*

A R T I C L E   I N F O

A B S T R A K

Media pembelajaran di Sekolah Dasar selama proses pembelajaran daring yang cenderung kurang inovatif dan penerapan metode konvensional berdampak pada minat dan pemahaman siswa pada muatan pelajaran IPA. Penelitian ini bertujuan untuk mengembangkan E-Book berpendekatan scientific. Produk yang dikembangkan diharapkan dapat dimanfaatkan secara mandiri oleh siswa. Penelitian ini merupakan penelitian pengembangan dengan menggunakan model pengembangan ADDIE. Metode pengumpulan data pada penelitian ini yakni kuesioner/angket dengan teknik analisis deskriptif kuantitatif. Penelitian ini terbatas sampai pada tahap pengembangan, karena tidak memungkinkan untuk melibatkan banyak siswa pada masa pandemic Covid-19. Validasi media berdasarkan penilaian ahli isi muatan pelajaran memperoleh skor 91,67% dengan kualifikasi sangat baik, ahli desain instruksional dengan perolehan skor 100% dengan kualifikasi sangat baik, ahli media pembelajaran memperoleh skor 100% dengan kualifikasi sangat baik. Hasil uji pengguna melalui uji perorangan pada 3 orang siswa memperoleh skor 93,33% dengan kualifikasi sangat baik, dan uji pengguna melalui uji kelompok kecil pada 12 orang siswa memperoleh skor 95,00% dengan kualifikasi sangat baik. Berdasarkan analisis data dari hasil validasi yang diperoleh, dapat disimpulkan bahwa media E-Book berpendekatan scientific ini layak untuk digunakan sebagai media pembelajaran pada muatan pelajaran IPA di kelas V Sekolah Dasar. Implikasi dari pengembangan E-book berpendekatan scientific ini memerlukan fasilitas penunjang pengoperasian E-Book baik itu laptop maupun handphone dan didukung dengan kemampuan mengoperasikannya, sehingga dapat dipergunakan secara mandiri.

A B S T R A C T

Less innovative learning media and conventional methods impact students' interest and understanding of science lesson content. The purpose of this research was to describe the design process and know the results of E-Book validation according to the effects of expert reviews, individual tests, and small group tests of scientifically designed E-Book products. The products developed were expected to be utilized independently by students. This research was development research using model ADDIE development. The method of data collection in this study was a questionnaire with quantitative descriptive analysis techniques. This research was limited to the development stage, as it was impossible to involve many students during the Covid-19pandemic. Media validation based on expert assessment of the lesson's content obtained a score of 91.67% with excellent qualifications, instructional design experts with a score of 100% with excellent qualifications, learning media experts received a score of 100% with excellent qualifications. Through individual tests on three students, user test results scored 93.33% with excellent qualifications, and user tests through small group tests on 12 students scored 95.00% with excellent qualifications. Based on the analysis of data from the validation results obtained, it can be concluded that this scientifically designed E-Book media was eligible to be used as a learning medium on science lesson content in class V of Elementary School. The implications of the development of this scientifically based E-book required supporting facilities for the operation of E-Book both laptops and mobile phones and supported by the ability to operate it to be used independently.

1. Introduction

Public awareness of the importance of education for the future is increasing. Education itself is designed to shape the personality of the next generation to become a better individuals. One of the ways

 Corresponding author
*E-mail addresses: : putunethakusumayuni16@undiksha.ac.id

that can be done to improve the quality of education is through implementing the learning process supported by several components, one of which is learning media. Media learning is everything that can be used to channel the sender's message to the recipient to stimulate the students' thoughts, feelings, attention, and interests to learn (Asarta & Schmidt, 2020; Tafonao, 2018) Students who learn using learning media will tend to be more interested in learning than students who only learn by listening to the teacher's explanation (R. M. Putri et al., 2019; Wang et al., 2019) Pandemic covid-19 today, transforming the learning process into online learning as one of the solutions to implement social distancing to prevent the chain of the spread of the covid 19 outbreak (Abbasi et al., 2020; Almaiah et al., 2020; Handarini & Wulandari, 2020) This online learning process affects the application of learning methods and the utilization of learning media. Google meet and WhatsApp groups become learning media that teachers commonly use in delivering materials. The use of this media makes students need assistance both from teachers and parents. The use of the same and repeated learning media has an impact on students' learning interests.

The delivery of materials through Google Meet and WhatsApp groups impacts the application of learning methods into lecture methods. The way of lectures is a verbal speech by the teacher to students in delivering teaching materials (Savira et al., 2018; Simamora, 2020) This method makes teachers more dominant in the learning process and less provides a learning experience for students, especially in the science content of grade V Elementary School. The lecture method impacts no activities performed by students or in other words, student activities are not seen in the learning process. It improves student activity in the learning process to better add and develop students' knowledge, insights, and learning experience (Maurin & Muhamadi, 2018) The learning process by applying lecture methods impacts students' understanding of the materials discussed and affects students' learning outcomes in the Midterm Assessment (PTS). This is in line with observations and interviews with the parents of grade V SD Cipta Dharma which showed that 40% of students have a standard score of KKM in the Midterm Assessment (PTS), especially Natural Science content. Based on the explanation, the learning media applied makes students unable to learn independently and less attractive to students. This less interesting learning media application greatly affects the learning process and students' understanding of the materials discussed. Teachers need innovation in the use of learning media to achieve learning objectives (Lawrence et al., 2020; Putra et al., 2017) Therefore, it takes learning media innovation that can be used independently and attractively for students. Learning methods applied during online learning affect students' understanding, especially in science content, so a learning approach can improve students' learning activities. Implementing innovative learning approaches and accompanied by student activities are expected to improve students' understanding, especially in the content of science lessons in the online learning process. With the gaps in applying learning methods and learning media, it is necessary to solve this problem. One solution that can be provided is to develop an E-book with a scientific approach.

E-Book stands for an electronic book or electronic book converted to digital format (Fathoni & Marpanaji, 2018) E-Book often referred to as a digital book, is a publication consisting of text, images, and sounds published in digital form that can be read on computers or other electronic devices android or tablets (Mentari et al., 2018). E-books can be opened using computers and other electronic devices depending on the developer E-Book developed in this study is distributed in HTML format to be used either through mobile phones or other digital equipment (Hisbiyati & Khusnah, 2017; Prabowo & Heriyanto, 2013). This e-Book has the advantage of being a learning medium that helps students to learn independently, increases students' learning interest due to relevant images and videos, and exercises that can be used to measure students' understanding. This E-book will be developed with a scientific approach to improving students' learning activities on science content. A scientific approach is a learning process designed for students to actively construct concepts, laws, or principles through the stages of observing (to identify or find problems), formulating problems, proposing or formulating hypotheses, collecting data with various techniques, analyzing data, drawing conclusions, and communicating a concept (Daryanto, 2014). Teaching science by applying a scientific approach can train the skills of the SCIENCE process that facilitates students to understand science as natural science is found and encourages students to create scientific information through scientific research.

The research who developed E-book as a learning medium in science learning shows that the E-book developed is worthy of being used as a learning medium on basic chemical law materials (Andani & Yulian, 2018). Research about an interactive E-Book, a mixed separation material based on the phenomenon of daily life, is validly used as a medium of learning (Jannah et al., 2017). Research conducted the learning process natural science shows that this scientific approach effectively improves the learning outcomes of grade V elementary students (Munggah et al., 2016). Other research applies a scientific approach in science learning, showed that applying the scientific approach makes students more actively learning, courageous and independent with an integrated understanding (Rahmi, 2017). There is

a gap between the expected online learning process, which is an engaging online learning process using innovative learning media and can be used independently, as well as the science learning process accompanied by learning activities during the online learning process. Therefore, developing scientific-oriented E-Book media on science lesson content for grade V elementary students is important. This study aims to describe the process of designing E-Book and knowing the results of scientifically oriented E-Book validation on the content of science lessons class V Elementary School based on expert reviews, user tests through individual and small group tests.

2. Method

This research was a type of research development. This research uses the ADDIE development model (Analyze, Design, Development, Implementation, and Evaluation). The research steps were based on this development model as follows. **First,** the analysis stage. At this stage, analysis of learning needs, facility analysis, analysis of learning materials related to product development was carried out. **Second,** the design stage. At this stage, the determination of hardware and software to create a building design of E-Book (storyboard and flowchart), design E-Book components using Microsoft Office PowerPoint and Flip PDF Corporate software, compile materials on E-Book, make E-Book assessment instruments and prepare Learning Implementation Plan (RPP). **The third,** the development stage. This stage including the production activities of the E-Book following the predetermined design and the final product of this development stage which validators and students can assess as test subjects. In order to produce a product that was suitable for use and quality, product trials were conducted. Product trials include product validation tests by experts and product tests by students. Experts' product validation test was conducted by 1 expert in the lesson's content, 1 instructional design expert and 1 learning media expert. While the product trials conducted by students include user tests through individual tests involving 3 students and small group tests involving 12 students of grade V SD Cipta Dharma. **Fourth,** the implementation stage(implementation). This implementation was done to know the user's response to the media for the learning process. The things that need to be done at this stage were product trials on the learning process. Due to the condition of the Covid-19 pandemic, which was not possible to hold activities involving many students, this research reached the development stage. **Fifth,** evaluation stage. The evaluation conducted in this study was a formative evaluation that includes validity tests by experts and product trials by users (students).The method of data collection in this study was the questionnaire method. The questionnaire method was used when analyzing students' needs, product validity tests by experts, lesson content experts, instructional design experts,learning media experts, and product trials. Products were tested on users through individual trials, and small group tests on students. The data collection instrument used in this development study was a questionnaire. The assessment instruments of this scientific-based E-Book product are as shown in Table 1, Table 2, Table 3, and Table 4. Questionnaire instruments were compiled using assessments based on the Likert scale (Darmadi, 2011) as shown in Table 5.

Table 1. Instrument Grid of Expert Content Assessment

No.	Aspect		Indicator	Number of Items	Total Items
1.	Curriculum	a.	Conformity of materials with basic competencies	1	3
		b.	Conformity of material with indicators	2	
		c.	Conformity of materials with learning objectives	3	
2.	Material	a.	Material suitability with student characteristics	6	7
		b.	Depth of material	4	
		c.	The right media support the material	8	
		d.	The material is easy to understand	7	
		e.	The material represents real life	9	
		f.	Provide other resources for learning	5	
		g.	Proper and consistent use of language	10	
3.	Evaluation	a.	Conformity of evaluation with materials	12	2
		b.	Conformity of difficulty level of problem with competence	11	
		Total			**12**

(Source: Suartama, 2016)

Table 2. Instructional Design Expert Assessment Instrument Grid

No	Aspect		Indicator	Number of Items	Total Items
1	Purpose	a.	Clarity of learning objectives	1	2
		b.	Consistency between goals, materials and evaluations	2	
2	Strategy	a.	Systematic delivery of material	5	4
		b.	Can motivate students	4	
		c.	Can motivate students	3	
		d.	Provide students with opportunities for self-learning	6	
3	Evaluation	a.	Provide evaluation questions to test students' understanding	8	2
		b.	Problems presented following learning indicators	7	
			Total		**8**

(Suartama, 2016)

Table 3. Instrument Grid of Learning Media Expert Assessment

No	Aspect		Indicator	Number of Items	Total Items
1.	Technical	a.	Ease of media use	1	3
		b.	Media can help students understand the material	3	
		c.	Media can motivate students	2	
2.	Display	a.	Good display quality	4	2
		b.	A harmonious and balanced display screen	5	
3.	Text	a.	Accuracy of typeface usage	8	3
		b.	Accuracy of use of font size	7	
		c.	Accuracy of the use of text spaces	6	
4.	Figure and Video	a.	The use of images in *the E-Book* supports learning	9	2
		b.	Use of videos that support material understanding	10	
			Total		**10**

(source: Suartama, 2016)

Table 4. Individual Test Instrument Grid and Small Group Test

No	Aspect		Indicator	Number of Items	Total Items
1	Display Design	a.	Display of *E-Book*	2	4
		b.	Readability of text	1	
		c.	Image clarity	4	
		d.	Clarity of link usage instructions (*Google Form* & *Youtube*)	3	
2	Material	a.	Easy-to-understand material	7	3
		b.	Clarity of material description	6	
		c.	Media encourages students in learning	5	
3	Evaluation	a.	Clarity of instructions for quality	9	3
		b.	The problem, according to the material	10	
		c.	Language is easy to understand	8	
			Total		**10**

(source: Sudarma, 2015)

Table 5. Likert Scale

No	Score	Information
1.	Score 1	Very Disagree
2.	Score 2	Disagree
3.	Score 3	Agree
4.	Score 4	Very Agree

(Source: Darmadi, 2011)

The analysis technique used in this study is quantitative data analysis. Metode descriptive analysis quantitative is a way of analysis/processing of data by systematically arranging numbers and / percentages to obtain general conclusions (Agung, 2014). Data obtained from validation assessment

questionnaires by experts such as lesson content experts, instructional design experts, and learning media experts and individual test subject response questionnaires and small group tests are analyzed with quantitative data analysis techniques. The assessment results of the experts and test subjects will be quantitatively analyzed using a formula to calculate the percentage of each issue. From the percentage calculation of each questionnaire, the data obtained will be analyzed to make meaningful decisions and decision-making on the quality and feasibility of the developed product—Decision-making of the percentage of assessment results using the provisions that shown in Table 6.

Table 6. Level of Achievement Convention on a 5 Scale

Achivement Level (%)	Qualification	Information
90 – 100	Very Good	No Revision
75 – 89	Good	Less Revision
65 – 74	Enough	Revised Sufficiently
55 – 64	Bad	Many Revision
1 – 54	Very Bad	Remaking Product

(Souce: Tegeh dan Kirna, 2010:83)

3. Result and Discussion

Results

This research developed learning media in scientific E-Book on the content of science lessons in grade V elementary school. This research was a type of development research. This study produced two main things: the design of scientific-based E-book and validation results from scientific-based E-Books according to expert reviews and user tests (students) through individual tests and small group tests. Analyze stage, at this stage; researchers conduct characteristic analysis of student needs, facility analysis, and content or material analysis before developing a product. Learning media can be used independently as needed, and students can still do learning activities to support students' understanding of science learning. The analysis of the characteristics of students' needs that have been done obtains the information that during the online learning process, students need new and easy-to-use learning media to be used independently and increase students' interest in learning, such as E-books. Teachers used the media during the tedious online learning process, such as Whats-App Group, Google Meet, and Google Form. In addition, it was known that all students have used personal communication tools and other supporting tools such as laptops to learn. This, of course, supports the development of E-book. Based on the results of interviews with class teachers and observations related to the assessment results for half a semester, it was known that students have constraints on science subjects. This was due to the learning process that applied lecture methods, so there was no student learning activity.

The second, the design stage. Researchers do things related to product design at this stage, such as creating a flowchart of E-Book in the form of a chart was made to help the preparation of the flow of content from the E-Book. Making a storyboard of the scientific-oriented E-book on the content of science lessons contains science learning scenarios, especially in the Digestive System and Diseases in the Digestive Organs. Storyboard contains the visual design of the E-Book and the outlines of the material on the E-Book, Outlines the content of the material on the media, designs the media, Composes learning activities, and creates product assessment instruments. This e-Book was developed using several applications and sites such as Microsoft Office PowerPoint, Flip PDF Corporate, Google, Google Form and YouTube. Third, the development stage. This stage included the production activities of the E-Book following the predetermined design and the final product of this development stage which validators and students can assess as test subjects. The production activities of this E-Book consist of activities: (1) Creation of E-Book materials with the help of Microsoft Office PowerPoint applications by the design that has been designed, (2) Collection of images relevant to the material in the E-Book through the Google site, (3) Search for videos relevant to the materials in the E-Book through the YouTube site, (4) Merging images relevant to the E-Book materials in Microsoft Office PowerPoint applications, (5) Preparing material-related exercise questions in the E-Book with the help of the Google Form site, (6) Converting E-Book files in Microsoft Office PowerPoint into a PDF form, (7) Uploading E-Book files in the form of PDF into flip PDF Corporateapplication, (8) Merging YouTube video links and Google Form links on E-Books. E-Book product feasibility trials were conducted to determine the quality and feasibility of the products that have been developed so that they can be used as learning media. Product feasibility is known through the assessment process provided by experts as validators and students as research subjects. Lastly, the evaluation stage. The last stage was to evaluate the data that has been collected at the implementation stage. Evaluation activities were carried out during the product development process to avoid errors in

the final product results. Evaluations were conducted in the form of formative assessment used to measure or assess learning products that include expert validation, individual tests and small group tests and knowing the feasibility of the product. The expert validation stage was based on lesson content experts, instructional design experts, and learning media experts.

The first finding, the expert content of the lesson, gave a rating with a score of 91.67% with excellent qualifications. There were no revisions of the product developed in terms of the content of the lesson load. **The second finding,** instructional design experts provided an assessment with a score of 100% with excellent product qualification. Based on the evaluation of instructional design experts, there are no revisions related to the product developed regarding learning design. **The third finding,** learning media experts, provided some inputs and revisions of product development. The revisions and inputs provided include the writing layout, background colors from theE-book,and background color variations. After revising the developed product, the media expert gives a 100% rating with excellent qualifications. After going through the validation stage, the product will be tested to users (students) through individual tests and small group tests. **The fourth finding,** product trials through individual tests, scored 93.33% with excellent qualifications. Based on the comments and suggestions given by students, it was known that students were interested and like the E-Book developed. **The fifth finding,** product trials through small group tests, scored 95.00% with excellent qualifications. Students' comments and suggestions show a positive response where students easily understand and material on the E-Book, like the E-Book developed because it can be accessed via mobile phone,and suggest adding more images. The result of scientifically designed E-Book on Natural Science payloads includes the display of the front cover to the back cover of the E-Book shown in Figure 1.
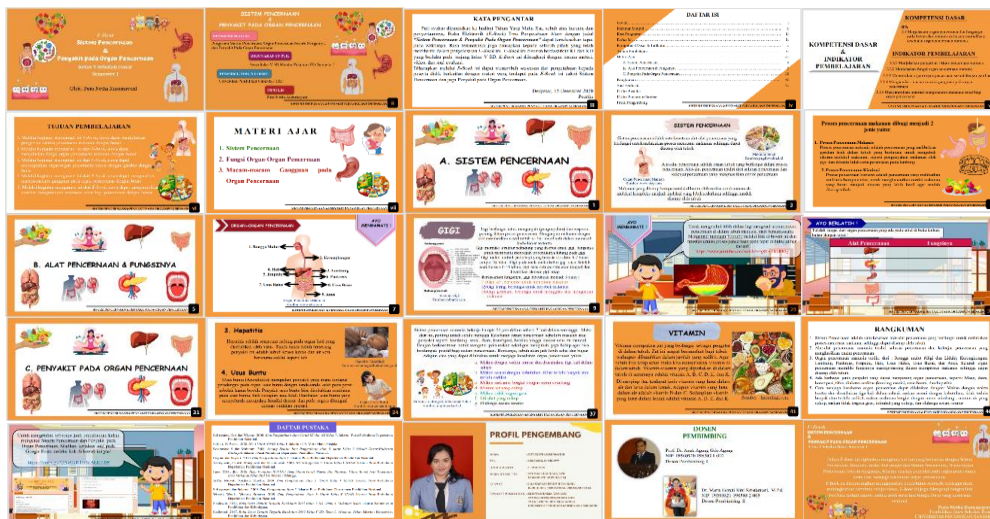

Figure 1. Final Result of E-Book Product

Discussion

Based on the results of the research that has been done, it was known that E-Book development products obtain excellent qualifications through validation results by experts (experts in content lessons, instructional design experts, learning media experts) and product test results to users (students) through individual tests and small group tests show a percentage with excellent qualifications, so it can be concluded that scientifically designed E-Books were worthy of being used as learning media on natural science content of class V elementary school. The assessment result of the expert content of the lesson was known that the E-book with excellent qualifications. It was said to be very good because assessing the content expert of the lesson that included aspects of curriculum, material, and evaluation showed the conformity between the material and basic competencies and indicators to achieve the learning objectives. Learning materials should be relevant to achieving competency standards and achievement of basic competencies reflected in the learning objectives (Churri & Agung, 2013; Pratiwi et al., 2017; Tinja et al., 2017). E-books with a scientific approach to science lesson content create many students' learning experiences through various activities such as observing images and learning videos and practicing questions. This provided a more meaningful learning experience directly (Afriana et al., 2016; Gogahu & Prasetyo, 2020; Sabtaningrum et al., 2020) and can be applied in daily life through natural science learning with E-Book products.

The assessment results from instructional design experts were known that the E-book developed was very well qualified with a spread score of 4. It was said to be very good because the assessment score of instructional design experts covering aspects of goals, strategies, and innovations showed that learning strategies in the   E-Book through applying scientific approaches could realize learning objectives. Applying the right learning strategy by teachers can create effective and efficient learning activities (Asrowi et al., 2019; Mol et al., 2009; Sembiring, 2013). Based on assessments from instructional design experts, it is known that the application of scientific approaches can improve students' learning activities. Applying the scientific approach in science learning is very suitable with constructivist theory so that learning becomes more meaningful (Jamil, 2019; Komalasari et al., 2019; Sugiyarti et al., 2015) because, with the application of this approach, students become more active in exploring their knowledge. Learning activities can develop students' skills to build their own knowledge and make learning meaningful (M. D. Putri & Arifin, 2017). So that the application of the scientific approach in this scientific-based E-book can improve the student's learning experience and student understanding.

The review of scientifically designed E-Book development products based on assessments from learning media experts obtained excellent qualifications. Assessment through questionnaire instruments/questionnaires with a spread of 4 scores with aspects of evaluation, namely technical, display, text, images and video. It was said to be very good because the E-Book developed has qualified such as clarity of information on illustrations, typefaces, font sizes, and languages used already under the characteristics of students. This was following two main principles of motivation in text and image design in text readability, namely using writing styles (such as size, type, numbering, spaces, and colors) that are easy to read and understand), and using simple and easy-to-understand language (such as using common language, using common words, using short words, using non-passive active sentences, etc.) (Sudarma, 2015).

Product test results to users (students) through individual tests or small group tests showed excellent product qualifications. Assessments obtained through individual tests and small group tests include aspects of display design, materials and evaluation. It was said very well because the products developed have been used to use learning media. Students can obtain messages, strengthen and expand knowledge (Riyana, 2011) and facilitate students in understanding the material studied (Aeni, 2019). Exploring the use of learning media was very important, especially during the online learning process as it was today. Scientific E-Book products can be used through mobile phones by students. Learning that applies android-based learning media makes students happier because the material was packed with relevant images and videos, and students can learn anytime and anywhere (Muyaroah, 2017). This was an advantage of the scientifically oriented E-Book on the content of science lessons.

The results of this study are supported by research conducted by (Gogahu (2020) it is known that the E-Book applied is worth using to improve the reading literacy of elementary school students. In addition, this research is also supported by the results of research Nuzulia (2017), whereby applying scientific approaches, the learning process, especially science, will be more in demand by students. Based on the research results, it was found that students can better understand the material, explore their knowledge and the learning process based on scientific work. The implications of the development of scientific E-Book on science lesson content, supported by facilities owned by schools and students, be it laptops, LCD and Projectors, and handphones. The utilization of this facility must also be supported by the ability of teachers and students to operate the facility so that the   E-Book can be appropriately used independently as a learning medium.

4. Conclusion

This scientifically designed E-Book development product is "Feasible" to be used as a learning medium on the content of science lessons in grade V elementary school. Where the validation of expert content of the lesson content shows the conformity between basic competencies, indicators, and materials on the learning media with learning objectives. Validation of instructional design experts showed the application of learning approaches to products could realize learning objectives. Validation of learning media experts showed that the product has qualified for clarity of information on the illustration, typeface, font size, and language used following the characteristics of the student.

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