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DEVELOPMENT OF E-BOOKS IN NATURAL SCIENCE (IPA) LESSONS BASED ON DISCOVERY LEARNING FOR HIGH CLASS STUDENTS IN PRIMARY SCHOOLS

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Abstract

This research aims to develop a teaching material, namely, ebook teaching material based on discovery learning in class V elementary school (SD) science learning on the water cycle. This research uses RnD (Research and Development) research with the ADDIE stage model steps (analysis, design, development, implementation, and evaluation). The subjects in this research were fifth grade elementary school students, with data collection techniques in the form of observation, interviews and questionnaires. Before collecting data from students, the research validated the product with experts. The percentage results obtained were media experts 98.86%, material experts 96.00%, and language experts 90.26% and these scores were categorized as very good. Then the product was tested on students with a score of 94.48% in the very good category. Apart from that, students were directed to take the pretest and posttest. The score obtained before using the product was 51 and after using the product, it was 86.5. Based on these results, it can be concluded that discovery learning-based e-book teaching materials are suitable for use in science learning for fifth grade elementary school.

Keywords : Teaching Materials, E-books, Discovery Learning, Science Learning

Introduction

Education has an important role in human life to gain useful insights in living a better life. The world of education continues to make changes to the curriculum to achieve the educational goals stated in Article 3 of Law no. 20 concerning the National Education System in 2003. Therefore, to compensate for changes in the curriculum, several improvements are needed which can be achieved by teachers by using innovative approaches, methods, models or teaching materials in various subjects, including science subjects. Natural Sciences (IPA) is a field of study that is studied and taught in schools from grade 1 to grade 6. The Independent Curriculum is a curriculum that is currently being implemented in Indonesian education. The Merdeka Curriculum provides meaningful learning, students are expected to be able to think critically, and be able to improve and use their knowledge to study something in learning. The Merdeka Curriculum refers to student competence and character, which aims to encourage students to observe, ask questions, reason and also communicate, so that learning is not teacher-centered. Therefore, teachers play a very important role in creating a meaningful learning process. 21st century education aims to create the nation's next generation who are independent, tough, and able to compete according to the demands of increasingly competitive times and increasingly advanced technology . In accordance with the "21st Century Learning Partnership" competency which refers to the 21st century education format, where learning is carried out by optimizing cyber or e-learning using an unlimited (distance) learning model carried out using the help of information and communication technology. One of the efforts made in facing the global world is improving the quality of education. Improving the quality of education is a reference in improving the curriculum

(Hidayat & Patras , 2006). One of the focuses of implementing the independent curriculum is to realize 21st century learning. This requires the implementation of education that is able to develop life skills in the 21st century, known as 4C skills. These skills are critical thinking skills, communication skills, creativity and innovation skills, and collaboration skills. The digital 21st century requires teachers and students to be experts in utilizing technology such as computers and smartphones in learning. In accordance with Minister of Education and Culture Regulation No. 22 of 2016, it is stated that the learning process in educational units is carried out in an interactive, inspiring, fun, challenging manner, motivates students to participate actively, and provides sufficient space for initiative, creativity and independence according to their talents, interests and physical development and student psychology. One of the subjects that utilizes 4C skills is science. Natural science is one of the main pillars of the development of science and technology because it provides an understanding of phenomena that occur in life (Festiyed, 2013).

Science learning requires students to do more research, experiments and practicums. Through experimental and practical activities, students can explain phenomena that occur in nature. Practical activities are an activity to discover a new concept or principle that has been formulated by previous experts (Jamaluddin, et.al., 2015). With practicum, students can develop their curiosity, be active, creative, innovative, and have a scientific attitude in finding a problem. Students must be able to build their knowledge to discover concepts and be directly involved in learning. The reality found in the field is that the quality of science learning is still relatively low. This can be seen from Indonesia's science score which is still far from the average science score of other countries , namely ranking 72nd out of 77 countries. The low quality of science learning cannot be separated from the resources and teaching materials provided during the learning process. The main problem that occurs in the field is that the teaching materials available in schools do not meet the learning needs and demands of the 2023 curriculum. Teaching materials in the form of teaching materials do not yet contain the 4C skills that students should have in the 21st century. Apart from that, the existing teaching materials do not yet show a learning model syntax that is in accordance with the independent curriculum. The teaching materials used have not been able to involve students directly in discovering learning concepts. Teaching materials have not kept up with developments in the digital era, are not interactive, are less flexible and communicative for students. This causes students to be less interested and motivated to participate in learning. Based on the problems raised, it is deemed necessary to develop an e-book based on discovery learning that integrates 4C skills. Discovery Learning is a learning model that involves students directly in the learning process (student- centered). The discovery learning learning model is a model for developing active student learning by discovering for themselves, investigating for themselves, so that the results obtained will be long-lasting in memory (Kusuma, TA, Indrawati, & Harijanto, 2015). Apart from that, discovery learning is a series of learning activities where the teacher presents teaching materials not in final form, but rather provides opportunities to search for and discover concepts for the material being studied for themselves (Harjono, Ahmad., Gunawan, 2016). In line with that, David (2017) stated that there are several steps to discovery learning including: Stimulation, problem identification, data collection, data processing, verification, and generalization. Through the steps of the Discovery Learning model, students are required to build their knowledge in real terms through discoveries in the form of experiments, demonstrations or practicums. In this way , students understand the concept because they experience the process of discovering it themselves. The main material that is crucial in learning is teaching materials.

One of the teaching materials that is in line with the demands of an independent curriculum in the 21st century is e-books. Therefore, e-books developed based on discovery learning can be used as well as possible in science learning. The use of e-books based on discovery learning is carried out to improve the 4C skills that students must have in 21st century learning. Science learning at a basic level can help students train and develop their capacity to practice clear and convincing scientific communication (Ni et al., 2018). Even though at the elementary school level, scientific communication may not be as complex as at a higher level, science learning can help students develop several important aspects of scientific communication through activities such as observation, experimentation, reading and understanding simple scientific sources, writing report results. , work together, and discuss. According to Larasati (2020), the discovery learning model can help students learn through the process of investigating and discovering, this allows students to remember the results and not easily forget them. This agrees with Ana (2019). Discovery learning does not provide overall learning, but discovery learning helps students improve their individual discovery abilities and makes learning more student-focused. The main activity in science learning in elementary schools is in the form of observation or experimentation. In accordance with the characteristics of elementary school students, the age stage of elementary school students is at the concrete operational stage. Therefore, it is necessary to have scientific actions carried out by students so that students are directly involved in learning, such as observing, asking, reasoning and communicating. Based on the results of

teacher observations and interviews with fifth grade elementary school teachers, the teaching materials provided by teachers to students were only thematic, without any other teaching materials. so that learning is still teacher-centered, therefore teachers need other teaching materials for students where these teaching materials support students to make observations, ask questions, reason and so on. Students need other teaching materials so that students' insight is not limited to just one material. One of them is that teachers use electronic media as other teaching materials that teachers use, one of which is e-books (Electronic Books). E-books are translations of electronic books or digital books. E-books are one of the results of advances in technology and information. However, the use of ebooks is not optimal because the material presented is quite extensive, and it has not produced anything that can make students more enthusiastic in learning.

When conducting observations and interviews, the fifth grade teacher stated that teaching materials such as e-books, if used for elementary school children, were not effective because the appearance of e-books did not attract students' interest and the large amount of material presented made students bored when reading them. As well as the presentation of material which is still teacher-centred, so that the learning process that has been carried out so far has not explored students' abilities to play an active role in learning. The teaching materials used are still classified as teaching materials in general. There needs to be an improvement in good teaching materials, in terms of form and method of presentation. By using e-books as teaching materials, it is hoped that students will be better able to become familiar with current technological advances, namely by using technological media as a reference in learning. An e-book that will present systematic learning to improve students' intellectual and skill abilities. Therefore, in accordance with current developments but not without scientific steps, this can be realized by applying a scientific approach in the learning process, namely in electronic teaching materials . E-book teaching materials are accompanied by material in accordance with scientific steps, namely observing, asking, concluding information, evaluating and communicating. These scientific steps are able to develop students' abilities to reason, think critically, be active and analytical. The use of e-books can also increase interaction between teachers and students in learning and students will be more interested in using e-books as teaching materials in learning. So the use of electronics is very important in the current millennial era. So that teachers use teaching materials that are appropriate for the millennial era. Based on this description, it is necessary to develop varied teaching materials, namely in the form of e-books which can be effective teaching materials for students, as well as broadening students' insight by developing e-books into more interesting e-books accompanied by for students, namely by developing e-books. based on discovery learning.

Research Methodology

The research method used in this research is Research and Development, which in English is called Research and Development (R&D). According to Salim and Haidir, Research and Development (R&D) is a series of processes or steps in order to develop a new product or improve an existing product so that it can be accounted for. In this case, the product produced by the researcher is an ebook teaching material based on a scientific approach. This e-book teaching material will be developed according to components or concepts that are in accordance with teaching materials in general. In this research, researchers used the ADDIE research model. The ADDIE model consists of five steps, namely: (1) analyze, (2) design, (3) development, (4) implementation, (5) evaluate. This research was carried out in elementary schools, namely by conducting user trials using one to one, small group and field test stages. This research on students was carried out by distributing questionnaires and conducting tests both before and after using the product. The analysis technique used is quantitative descriptive analysis technique. This technique is used to process the results of questionnaires used in data collection questionnaires. Descriptive statistics are statistics that are used to analyze data by describing or illustrating the data that has been collected as it is without the intention of making general conclusions or generalizations.

Result & Discussion

One of the steps in the development strategy is the development of ADDIE. The ADDIE model consists of five steps, namely : 1) analysis, 2) design, 3) development, 4) implementation, 5) evaluation. These five steps constitute a development stage where the product will be developed into a better product. The following is an explanation of each stage in developing discovery learning-based e-book products.

Analyze

This first stage was carried out by researchers, namely by conducting interviews and observations with fifth grade elementary school teachers to obtain a needs analysis regarding teaching materials that can support students' insight and teaching materials that are in accordance with current technological developments. The results of

interviews with fifth grade elementary school teachers and observations obtained stated that there were several problems in the use of teaching materials, namely that students only used thematic as teaching materials and there was a need for additional effective teaching materials for students in conditions like this, the delivery of learning materials was carried out only by just send the assignment. Teachers want to create other teaching materials that are in line with technological advances and are effective in learning, such as e-books, and there is a need for teaching materials that improve students' abilities, such as teaching materials that apply a scientific approach, including scientific or natural science learning. The results of the interviews and observations were used as material for developing products that suit students' needs, then the researchers collected several reference sources in making electronic books. The results of this data collection were used as a basis for developing products in the form of electronic books based on a scientific approach for fifth grade elementary school students. Based on the results of the needs analysis, researchers are trying to develop e-book teaching materials based on a scientific approach that can be opened via a link that will be disseminated to students, so that the learning process continues to run more optimally and effectively. Researchers also looked for several supporting sources related to e-book development, scientific approaches, and student character to adapt teaching materials to suit student character and development.

Design (Design)

This design stage includes making an initial draft, namely the researcher designs the initial draft of the electronic book, including the opening, contents, evaluation and closing sections. This e-book teaching material is prepared in accordance with teaching materials in general which consist of learning instructions, competencies to be achieved , materials, and evaluation. As well as what content is in the electronic book. Then the preparation of science learning materials regarding the water cycle is arranged according to basic competencies. So the researcher made an initial draft of a concept map for preparing water cycle material which will be displayed in e-book teaching materials for class V elementary schools. In the e-book there is also a presentation of material through video presentations. The material is said to be presented in scientific-based stages which include the observing stage, namely in the form of observing an image or video, asking several questions before presenting the material, searching for information, evaluating and communicating.

Development (Development)

At this stage the researcher carried out development in three stages, namely the stage of making e-book teaching materials based on a scientific approach, expert review, namely on media experts, material experts and language experts and the final stage was user testing on fifth grade elementary school students with carry out three stages, namely one to one, small group and field test. Making e-book teaching materials based on a scientific approach is created and developed starting from the front cover, to the final page consisting of a table of contents, study instructions, concept maps, material contents, learning videos, practice questions, LKPD, glossary and bibliography. Researchers develop and create e-books on MS software. Power Point 2010. The e-book teaching materials that have been developed are then validated by experts to determine the suitability of the e-book and ask for input and suggestions regarding the teaching materials to be developed , namely by involving material experts, language experts and media experts. Based on the results of research recapitulation from experts (Expert Review), material experts, language experts and media experts. If we refer to the product suitability category, this e-book teaching material is in the very good category. In this validation process, researchers also received input and suggestions regarding the product being developed. After making improvements based on experts' suggestions, the researchers then tested the product on fifth grade elementary school students. The researchers tested the improved e-book teaching materials on users, namely fifth grade elementary school students, through three stages, namely the individual assessment stage (one to one) and the small group stage and expanded trial (field test). In the trial process, researchers took scores by distributing questionnaires and formative tests in the ebook via Google Form and students were directed to fill in the questionnaire. The results of the one to one, small group and field test user test assessments obtained a score presentation of 94.48 % . Based on the score percentage results, ebook teaching materials can be categorized as very good.

Implementation

The fourth stage in this development research is the implementation stage. The product that has been developed is then given to users, namely fifth grade elementary school students. This e-book teaching material based on a scientific approach is also tested for its suitability in learning, namely by providing practice questions before starting learning and after learning. The function of the pre-test and post-test questions which are carried out by filling in the Google Form in the application of this teaching material is to determine students' abilities and the

suitability of the water cycle electronic book teaching material in the learning process. At the implementation stage, students were directed to work on pretest and posttest questions, the average score before students used the water cycle electronic book teaching materials and after using the water cycle electronic book teaching materials increased from an average of 51 to 86.5, so the cycle electronic book Water is suitable for use as additional teaching material for students in the learning process.

Evaluate (Evaluate)

At each development stage, e-book teaching material products based on a scientific approach have an evaluation stage, both in the design, development and implementation stages. The evaluation obtained is by including suggestions and comments from experts, namely material experts, language experts and media experts. As well as user trials on fifth grade elementary school students, and the evaluation stage was carried out in 3 stages, namely through one to one, small group and field test stages. The results of the assessment from experts, namely material experts, language experts and media experts, obtained product feasibility presentation results with an average score of 98.86% for media experts, 96.00% for material experts and 90.26% for language experts and based on percentage of these scores, then the e-book teaching materials are categorized as very good. The results of the user test on students went through 3 stages, namely the one to one stage, small group and field test by obtaining product feasibility presentation results with an average score of 94.48 % . Based on the percentage score results, e-book teaching materials can be categorized as very good.

Conclusion

Based on assessments from experts and the results of user trials for fifth grade elementary school students, it shows that e-book teaching materials based on discovery learning in science learning can have a very good category and are suitable for use in learning, so that e-book teaching materials are based on a scientific approach to learning. Discovery learning-based science in fifth grade elementary school science learning regarding water cycle material is suitable for use as additional teaching material for students. The assessment from the experts obtained product feasibility presentation results with an average score of media experts of 98.86%, material experts of 96.00%, and language experts of 90.26% and based on these score percentages, ebook teaching materials were categorized as very Good. Next is the assessment stage for students through one to one, small group and field test stages. In the trial process, the product feasibility presentation results were obtained with an average score of 94.48 % and based on the percentage score results, the e-book teaching materials could be categorized as very good. To determine students' abilities, researchers gave pretest and posttest questions at the implementation stage. This activity was carried out so that researchers knew students' abilities and determined the feasibility of the product by comparing the pretest and posttest results. The average score obtained before and after using the ebook increased from an average of 51 to 86.5, so the water cycle electronic book is suitable for use as additional teaching material for students in the learning process. Suggestions made based on the results of this research include ; (1) Teachers should strive to develop their creativity in packaging material in order to improve students' scientific communication skills. (2) Schools should provide teachers with training and evaluation in order to improve teaching quality.

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