

Development of Teaching Materials in the Form of E-Books Assisted by Professional Flip Pdf Applications with the Theme of Environmental Conservation to Empower Environmental Care Attitudes

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Abstract

The development of an e-book with the help of a professional flip pdf application with the theme of environmental preservation is motivated by the learning objectives of Natural Sciences (IPA), including to foster a positive attitude and students' awareness of the importance of protecting the environment. Achievement of research objectives in e-book development to empower students' environmental care attitudes through a series of activities contained in e-book systematics. This research was conducted in December 2022. The research method used was Research and Development R&D, the research design used Borg and Gall and used 7 of 10 simplified research stages, adjusted based on research and development needs, namely up to the product revision stage. The instrument used was a validation sheet for the validity test which was carried out by 3 validators namely teaching material experts, material experts and science subject teachers. The development of the e-book is carried out using indicators of environmental care, namely Basic Competency (KD) which is used according to the theme of environmental preservation, presentation of pictures and videos about the dangers of environmental pollution around students' residences, about orders to implement greenery and dispose of waste in its place, as well as case studies on environmental pollution. The results of the development of the e-book were then validated by 3 validators with an average percentage of 92.9% with the criteria of "Very Good" which means that the e-book shows valid results and can be used for the trial stage.

Keywords: E-Book, Environmental Preservation, Environmental Care Attitude



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INTRODUCTION

Integrated science learning is an approach taken to the science learning process that can make students active in searching for, to find a comprehensive and interrelated concept and principle. Integrated science learning consists of significant concepts into a theme, the theme results from the classification and merging of several materials, so that the material is not delivered repeatedly, is efficient in the use of time and is effective in achieving learning objectives (Taufiq et al., 2014). Science learning objectives according to Permendiknas Number 22 of 2006 concerning educational content standards explained that the objectives of learning science are: 1) Increasing belief in the greatness of God Almighty based on the existence, beauty, and orderliness of His natural creation. 2) Develop an understanding of various kinds of natural phenomena, concepts and principles of science that are useful and can be applied in everyday life. 3) Developing curiosity, positive attitude, and awareness of, the existence of interrelationships, influences between science, environment, technology and society. 4) Conducting scientific inquiry to cultivate the ability to think, act and act scientifically and communicate. 5) Increase awareness to participate in maintaining, protecting and preserving

the environment and natural resources. 6) Increasing awareness to appreciate nature and all its order as one of God's creations. 7) Improving science knowledge, concepts and skills as a basis for continuing education to the next level.

Based on the objectives of learning science at point number 5 it is very appropriate, that the purpose of learning science about the surrounding conditions is to increase awareness of other humans and play a role in maintaining, preserving and preserving the environment and natural resources. The low quality of the environment today is the result of human indifference to the environment. Most people are aware of the dangers posed by the various activities they carry out, but they do not have the awareness to leave it. One effort to increase awareness of the environment is through education.

Through education, ethics and values can be instilled to care for the environment. In general, it can be said that education is a driving force for change and is one of the keys to the formation of people and society who are aware of the environment. Education is a strategic vehicle in an effort to foster an attitude of caring for the environment, thus the important thing in tackling environmental problems is a fundamental change in human attitudes towards the environment. Development of attitudes, one of which is caring for the environment, is relevant to the 2013 curriculum which promotes a balance between attitudes, skills and knowledge to build soft skills and hard skills. Science learning emphasizes the educational aspect rather than concept transfer because in science learning students are expected to have an understanding of a number of concepts and develop and train their attitudes, values, morals and skills based on the concepts they already have.

The use of teaching materials is one of the determining factors for the success of a learning process. Teaching materials that meet the good criteria will give birth to an effective learning process, however, on the contrary, if the teaching materials used are not in accordance with the criteria and demands of basic competencies, then what will arise are problems in learning (Taufina et al., 2020). On June 23, 2020, researchers conducted a pre-research survey of science students and teachers at SMP Negeri 2 Pulosari to analyze student needs and the application of teaching materials used by the science teacher. The results of the surveys and interviews indicated that students tended to get bored when learning science subjects, because the teaching materials used by science teachers were conventional, such as printed books, which looked less attractive.

The needs of students regarding teaching materials that are able to empower environmental care attitudes are in accordance with the results of interviews conducted with science teachers that at SMP Negeri 02 Pulosari the teacher stated the condition of the students there who were less aware of the importance of protecting the environment. under the table, in the school garden, destroying plants in the school garden, researchers are trying to develop teaching materials in the form of e-books with material, questions based on indicators of caring for the environment, in order to foster a positive attitude and students' awareness of the importance of protecting environment. Achievement of research objectives in the development of this e-book is to empower students to care for the environment, by displaying the suitability of KI and KD and the themes used, facts about the dangers caused if students do not take care of the environment around them, questions about efforts made when the environment is dirty , about orders for the implementation of greening and case studies on environmental pollution in e-book systematics.

The choice of e-books as a development of teaching materials is due to their attractive digital features (Zakiyatus S&A Kholiq, 2020). The e-book created by the researcher will use the

help of a professional flip pdf application. In the process of making an e-book, the researcher uses the help of a professional flip pdf application. The application is not fixated on writing only, but can include moving animation features, video and audio which can make teaching materials more interesting so that learning is not monotonous. In developing teaching materials in the form of e-books, researchers chose environmental pollution materials.

The choice of caring for the environment as a point to examine is due to the fact that attitudes have a very important position in achieving learning success. One of the efforts to increase the attitude of caring for the environment at SMP Negeri 2 Pulosari is by using indicators of the ability to care for the environment in teaching materials that will be used by students so that students become more aware of the importance of protecting the environment because students see the material presented in video form. animation, which is interesting in e-books that are based on environmental care attitude indicators, namely: Fostering an attitude of caring for the environment in classes and schools, namely by displaying interesting teaching materials and content according to KI and KD and the themes used, fostering curiosity what dangers are caused if students do not take care of the environment around them, provide a collection of questions related to the efforts made when they see a dirty and unkempt environment, give instructions so that students carry out the go green program in the school environment and where they live, give facts -facts of natural phenomena that occur due to pollution.

The author formulates a theme of environmental preservation with a connected integration model in which the main KD is Environmental Pollution 3.8 Analyzing environmental pollution and its impact on ecosystems, ecosystem supporting KD 3.7 Analyzing interactions between living things and their environment and population dynamics as a result of these interactions and KD Climate change 3.9 Explaining the impacts of climate change related to environmental pollution, from this theme the main material becomes reference material in making e-books to empower students' caring attitude towards the environment.

In connection with the research conducted, the researcher wants a change that occurs in the learning process in obtaining knowledge and an attitude of caring for the environment. An active learning process using teaching materials which will later guide students to acquire science lessons. Based on the research background, the formulation of the problem in this study is: How is the development of teaching materials in the form of e-books assisted by professional flip pdf applications on the theme of environmental preservation to empower environmental care attitudes? What is the validity of developing teaching materials in the form of e-books with the help of a professional pdf flip application on the theme of environmental preservation to empower environmental care attitudes? Research Objectives: Developing the development of teaching materials in the form of e-books assisted by the flip pdf application professional on the theme of environmental preservation to empower attitudes of caring for the environment.

Literature Review

Teaching Materials

Teaching materials are a very important part of the learning process and are a part of teaching resources which can be interpreted as something that contains specific or general learning messages that can be used for learning purposes. A teaching material must be designed and written with instructional principles because it will be used by students to assist and support the learning process (Ina M et al, 2020). According to Hilmi, teaching materials are a set or learning tool that contains learning materials, learning methods, methods, limitations,

and ways of evaluating that are designed systematically and attractively in order to achieve the expected goals, namely achieving competencies or sub-competencies with all their complexity. (Hilmi, 2020).

Development of Teaching Materials

Teaching materials really need development, so that the availability of teaching materials is in accordance with student needs, curriculum demands, target characteristics and demands for solving learning problems. The development of teaching materials must be in accordance with the curriculum, meaning that teaching materials must comply with the applicable curriculum, for example currently the 2013 curriculum refers to good National Education Standards, both content standards, process standards and graduate competency standards. Then the target characteristics are adjusted to the environment, interests and backgrounds of students (Hilmi, 2020).

Principles of Teaching Materials Development

The principles for developing teaching materials (Ayu Safrina, 2021) are: The principle of relevance (relatedness). Learning materials should be relevant to the basic competencies and desired indicators. Principle of consistency. If there are four kinds of basic competencies that must be mastered, then the teaching materials taught must include four kinds as well. The principle of adequacy means that the material provided should be sufficient enough to help students master the basic competencies being taught. Material should not be too little and too much.

Teaching Materials Development Goals

The objectives of developing teaching materials are as follows: Providing teaching materials that are in accordance with the demands of the curriculum with the aim of the needs of students, namely teaching materials that are in accordance with the characteristics and social environment of students. Improving the learning process to be more effective and interactive. Changing the role of the teacher from a teacher to a facilitator. Make it easier for students to get alternative teaching materials from sources other than at school such as books and texts that are difficult to obtain. Ease the teacher's burden in carrying out learning activities. As an evaluation tool or mastery of learning outcomes (Wiyanto & Bachtiar AH, 2020).

E-Book Function

The functions of e-books according to (Revany Laraswati, 2020) include: Alternative learning media. Can contain multimedia content in it so that it can present more interesting teaching materials and make learning more interesting and fun. As a medium of information that can be disseminated more easily. Protect the information conveyed, in contrast to physical books that can be damaged, wet, or lost, e-books are protected from these problems, if lost, you can easily find a replacement on the internet or ask for it back from the e-book maker. Simplify the process of understanding teaching material. Help students understand learning. Attract students' attention when learning takes place. Assist teachers in delivering material to students. Generating student motivation towards learning. Generate student responses when responding to stimulus.

Environmental Care Attitude

The term environmental care attitude has three keywords, namely attitude, caring, and the environment. Therefore, the nature of caring for the environment can be viewed from the

basic assumptions of understanding attitude, caring and the environment and the interrelationships between the three. The attitude of caring for the environment possessed by humans as a result of the learning process can increase human concern for the sustainability of the carrying capacity of the natural environment. Someone will have a caring attitude towards the environment because of habituations that take place continuously and continuously. The e-book teaching materials made in this study included a collection of materials, questions related to the research objective, namely the development of e-book teaching materials on the theme of environmental preservation to foster an attitude of caring for the environment in junior high school students.

Indicators of caring for the environment according to (Agus Zaenul Fikri, 2017): Fostering an attitude of caring for the environment in classes and schools, namely by displaying interesting teaching materials and content according to KI and KD and the themes used. Growing curiosity about the dangers that arise if students do not take care of the environment around them. Provides a collection of questions related to the efforts made when viewing a dirty and neglected environment. Giving instructions so that students carry out the go green program (greening) in the school environment and where they live. Provide facts about natural phenomena that occur as a result of pollution and provide case studies on environmental pollution to students.

Connected Type Integration

Connected type integration is integration that teaches a KD, the concepts in the KD are linked to concepts in other KD Kemendiknas (2011). The focus of connected-type integration is an explicit connection that connects one topic to the next, a concept to another, one ability to related abilities, or connects one semester to the next. Fogarty (2009). This is in line with what was revealed by Dimiyati (2016) that connectedness deliberately connects one concept to another, one topic to another, one area of development to another field of development, and from one subject to another. other. It can be concluded that in the connected type integration a KD and its concepts become the core learning concept, while the concepts contained in other KD are linked to enrich it. This makes the integration of connected types able to see problems not only from one field of study of the Ministry of National Education (2011).

The Connected Integration Model with the Theme of Environmental Conservation

The connected integration model is a model that connects elements related to one field of study, these elements can be in the form of concepts, topics, principles or skills that are able to meet students' needs. So in the connected type integration model there is a model consisting of 1 main KD and several supporting KD which are determined in a learning theme. The main KD is the focus in explaining a material, to support the material in the main KD so that it is deeper and broader then it is supported by several supporting KD as a prerequisite for conveying the main KD. The author formulates a theme of environmental preservation with a connected integration model in which the main KD is Environmental Pollution 3.8 Analyzing environmental pollution and its impact on ecosystems, ecosystem supporting KD 3.7 Analyzing interactions between living things and their environment and population dynamics as a result of these interactions and KD Climate change 3.9 Explaining the causes and impacts of climate change related to environmental pollution, from this theme the main material becomes reference material in making e-books to empower students' caring attitude towards the environment.

Relevant Research

1. Assessment of Scientific Attitudes in Learning Science. This research was conducted by Herson Anwar in 2009. The researcher drew the conclusion that a scientific attitude is an attitude that must exist in a scientist or academician when facing scientific problems. This scientific attitude needs to be familiarized in various scientific forums, for example in discussions, seminars, workshops, and writing scientific papers Anwar (2009).
2. Development of e-book-based learning media to improve students' conceptual understanding of magnetic field material. This research was conducted by I Dewa Putu Leo Parlin, State University of Jakarta 2015. The researcher drew the conclusion that learning media in the form of multimedia is capable of increasing the effectiveness of physics learning activities which in turn will increase students' conceptual understanding skills and seek new innovations to maximize students' abilities. Parlin (2015).
3. Application of the flipbook innovation as a learning medium to improve learning outcomes in the introduction of php for class XI RPL at SMK Negeri 2 Mojokerto. This research was conducted by Bagus Putra Hari Searmadi majoring in information technology education, faculty of engineering, Surabaya State University in 2016. The researchers concluded that there were differences in the use of learning media in the form of innovation flipbooks with learning. Using conventional media. It can be said that the respondents responded well to the innovation flipbook learning media in the subject of web programming material HP Searmadi (2016)

The research carried out is another form that is almost similar to previous studies that developed e-book-based learning media. Thus this study has some similarities and differences, the similarities in this study are based on the development of learning media based on the Flip PDF Professional application, while the difference lies in the results of the application or media used by e-books which are more varied, time and place of research.

RESEARCH METHODS

The research method used in this development research is the research and development method (Research and Development R&D). Research and development methods Research and Development (R&D) is a research and development method used to produce a product and test the quality of the product (Sugiyono, 2015).

1. Preliminary Study (Research and Information Collecting). The first step was a preliminary study which included a literature review and needs analysis which was carried out by interviewing Class VII science teachers at SMPN 2 Pulosari. A literature review was conducted to collect and review references related to media and their development, while interviews with Science teachers Class VII SMPN 2 Pulosari were conducted to find out problems, student needs, curriculum and materials that require teaching materials in order to improve students' abilities. analyzed first.
2. Planning Research (Planning). The second step is planning research (Planning) by making a draft, namely research proposals for the development of E-Book teaching materials, by formulating research objectives, research benefits, research methods, schedules etc.
3. Design Development (Preliminary Development of Product). The third step is to design the product to be developed, namely E-Book teaching materials, the first step is to determine the content and objects to be used in learning media, create a design in which it discusses material with the theme of environmental preservation and create an attitude scale

instrument related to material, this learning media uses the Flip PDF Professional software which is stored in the file extension (exe).

4. Limited Preliminary Field Testing. The fourth step is a limited preliminary field trial by conducting a validation test which is an activity to test products in the form of E-Book teaching materials with certain conditions based on the assessment of several instruments given to teaching materials experts, and material experts, suggestions or input and expert criticism media and material experts regarding the validity of the E-Book teaching materials and the use of the E-Book teaching materials. The validation test was carried out to obtain data on the quality of E-Book teaching materials which were developed using a validation sheet instrument in the form of a questionnaire. The questionnaire instrument provided aims to obtain validation data from media and material experts on the developed E-Book teaching materials. This is in order to improve the developed E-Book teaching materials so that they become appropriate teaching materials used in the learning process, become effective teaching materials and have good quality.
5. Revision of Limited Field Test Results (Main Product Revision). The fifth step is to revise the limited field test results with product improvements after validation will get input from teaching material experts, material experts who will benefit from revising. It is intended that the E-Book teaching materials developed are ready to be used for further activities, namely product trials.
6. Feasibility Test (Operational Field Testing). The sixth step is the feasibility test, this activity is to test the feasibility of the product carried out by researchers at SMPN 2 Pulosari, where researchers test the feasibility of the product by looking at student responses or responses to E-Book teaching materials, to see the teaching materials students are given e-books based on PDF Professional software. The trial was conducted on 30 students of SMP Negeri 2 Pulosari. The questionnaire instrument provided in the form of a Google form aims to obtain data on student responses to the developed E-Book teaching materials. The students' responses were to improve the E-Book teaching materials that were developed so that they became teaching materials that were suitable for use in the learning process, teaching materials that were effective and of good quality.
7. Final Revision of Due Diligence Test Results (Final Product Revision). The seventh step or the final step is the final revision of the due diligence results, this activity is to improve or revise the E-Book teaching materials according to the results of student responses and student suggestions to make the developed E-Book teaching materials suitable for use in learning process, and making E-Book teaching materials effective and of good quality.

The subject of this study is the E-Book teaching material assisted by the Flip PDF Professional application with the theme of Environmental Conservation which the researcher will develop. This research will be conducted at SMP Negeri 2 Pulosari which is located at Jalan Koranji, Koranji District, Pandeglang Regency, Banten Province. The research was conducted in the odd semester of the 2022/2023 school year. The time of the research was carried out in December 2022

RESEARCH RESULTS AND DISCUSSION

Development of E-Book Teaching Materials ssisted by a professional pdf flip application on the theme of environmental preservation to empower environmental care attitudes

The following are the results of the development of e-book teaching materials in terms of its components:

1. Design. At the design stage, the researcher begins to design how the design will be used in e-books that can increase environmental care attitudes according to the environmental care attitude indicator, namely the first indicator displays interesting teaching materials and is in accordance with KI and KD and the themes used. Researchers developed teaching materials in the form of e-books based on application files consisting of concept maps, materials, pictures, supporting videos, and student evaluation materials in the form of practice questions. The design was made based on indicators of caring for the environment, namely on the book cover, concept map, material content and evaluation (practice questions) there are things that can foster curiosity about what dangers are caused if students don't take care of the surrounding environment, on e- This book shows pictures, videos, animations, stickers and some questions that can increase students' curiosity about environmental pollution. The hope is that after students' curiosity grows, it can encourage students to think critically and be able to move students to be sensitive to the surrounding environment. The exercise questions presented in this e-book teaching material are in the form of questions asking students to carry out the go green program in the school environment and where they live. The e-book displayed is questions related to environmental preservation efforts, such as students being ordered to bring plants their respective residences to be planted in the school garden as a reforestation activity.
2. Material/content of the E-Book. The results of the development of e-book teaching materials can also be seen in terms of material, the material is formed by a theme, namely material with the theme of environmental preservation to empower an attitude of caring for the environment. The material is made integrated using the connected integration model. The connected type integration model is a model consisting of 1 main KD, namely KD 3.8 analyzing environmental pollution and several supporting KD namely KD 3.7 analyzing ecosystems, KD 3.9 analyzing climate change, and KD 4.8 regarding implementing ways to overcome environmental pollution and contains indicators environmental care attitude:
 - a. Fostering an attitude of caring for the environment in classrooms and schools, namely by displaying interesting teaching materials and content that is in accordance with KI and KD and the themes used, this e-book displays material in the form of audio-visual which explains the impact caused by environmental pollution and how to prevent it , as well as pictures related to environmental conservation efforts, there are animations that invite students to participate in environmental conservation efforts.
 - b. Growing curiosity about the dangers that arise if students do not take care of the environment around them, this e-book shows pictures, videos, animations, stickers and several questions that can increase students' curiosity about environmental pollution material. The hope is that after students' curiosity grows, it can encourage students to think critically and be able to move students to be sensitive to the surrounding environment.
 - c. Provides a collection of questions related to the efforts made when viewing a dirty and neglected environment. This collection of questions invites students to empower an attitude of caring for the environment, featuring questions and illustrated case studies in the form of pictures and animated videos.
 - d. Giving instructions so that students carry out the go green program (greening) in the school environment and where they live. The e-books displayed are questions related to environmental conservation efforts, such as students being ordered to bring plants from their respective homes to be planted in the school garden as a reforestation activity.

- e. Providing facts of natural phenomena that occur due to pollution and providing case studies on environmental pollution to students is displayed in the form of videos, pictures and also animations.

Based on the results of research on the development of e-book teaching materials that have been carried out, that the materials used in each component of the teaching materials are effective, efficient and environmentally friendly. Then the questions and also the contents of the material in the form of videos, animations, voiceovers have compatibility with the dimensions of knowledge, behavior (affective) and dimensions of students' cognitive thinking processes and in accordance with indicators of environmental care attitudes. After the product has been developed, the next step is to evaluate the product with an expert validity test. In this case, e-book teaching material experts consist of teaching material experts, material experts and science subject teachers. Experts assess e-book teaching materials using a questionnaire that researchers have prepared.

The e-book teaching material developed in this research and development is an e-book teaching material on the theme of environmental preservation. The teaching material developed is an electronic media book. The development of e-book teaching materials that have been carried out uses the Borg and Gall (2003) research and development method which is simplified and adapted based on the needs of the research and development carried out. Based on the 10 stages of development research according to Borg and Gall (2003) the researchers simplified and limited them to 7 stages. The study used 7 stages out of 10 in the Borg and Gall (2003) research model, namely until the product revision, according to what has been described in the research results. This is in line with Borg and Gall (2003) who suggested that in research for the undergraduate level, research is limited to a small scale, namely until a product is produced. In this study, the special focus on the contents of the e-book development material is empowering environmental care attitudes in students, referring to the environmental care attitude indicator according to (Agus Zaenul Fikri, 2017), namely:

1. Fostering an attitude of caring for the environment in classes and schools, namely by displaying interesting teaching materials and content that is in accordance with KI and KD and the themes used, in this e-book material is displayed in the form of audio-visual which explains the impacts that occur due to environmental pollution and how to prevent it, as well as pictures related to environmental preservation efforts, there are animations that invite students to participate in environmental preservation efforts.
2. Growing curiosity about the dangers that are caused if students don't take care of the environment around them, this e-book shows pictures, videos, animations, stickers and some questions that can increase students' curiosity about environmental pollution material. The hope is that after students' curiosity grows, it can encourage students to think critically and be able to move students to be sensitive to the surrounding environment.
3. Provide a collection of questions related to the efforts made when viewing a dirty and neglected environment. This collection of questions invites students to empower an attitude of caring for the environment, featuring questions and illustrated case studies in the form of pictures and animated videos.
4. Giving instructions so that students carry out the go green program (greening) in the school environment and where they live. The e-books displayed are questions related to environmental conservation efforts, such as students being ordered to bring plants from their respective homes to be planted in the school garden as a reforestation activity.

5. Providing facts about natural phenomena that occur as a result of pollution and providing case studies on environmental pollution to students shown in the form of videos, pictures and also animations.

The Validity of E-Book Teaching Materials on the theme of environmental preservation to empower environmental care attitudes

Validity is a criterion for the quality of teaching materials seen from the quality aspect of the teaching materials developed and the material contained in these teaching materials, the level of validity is determined by experts who test the validity of the teaching materials developed by Mustami, M.K., et al., (2019). In this study, the validity level of E-Book teaching materials was determined by teaching material expert lecturers, material expert lecturers, and science subject teachers.

1. Validity Test by Lecturers of Teaching Materials. Based on the results of the validity test research by teaching material expert lecturers, it can be discussed from every aspect. First, the display aspect, namely the aspect that assesses the validity of e-book teaching materials in terms of appearance, seen from each component, namely in the form of flipbooks/electronic books, pictures, supporting videos, animations adapted to the designs that have been made, compatibility with environmental preservation theme material, accuracy in choosing colors, pictures, videos, animations, voice actors, suitability for the use of the letters used and accuracy in the use of language according to the KBBI spelling in the E-Book teaching material. The assessment on the display aspect obtained 92.5% of the value given by the teaching materials expert lecturer, meaning that from the display aspect the developed E-Book teaching materials have a very good category, this is due to the suitability of the e-book that has been made easy to use, easy to carry, can be accessed anywhere, can be stored and used. Then the slides contained in the e-book have a very attractive design for use in science learning, materials, videos, pictures and voice acting are designed according to the theme of environmental preservation, which uses a lot of green and blue colors which mean a clean and green environment free from environmental pollution. Second, the aspect of use, namely the aspect that assesses the validity of the E-Book teaching materials seen from the ease of use, convenience and storage, and the clarity of the instructions for use contained in the e-book teaching materials. An assessment on the aspect of use obtained a value of 100%, the value was given by a teaching material expert lecturer, meaning that from the aspect of use the e-book teaching developed has a very good category, this is because teaching e-books are very easy to use in the student learning process, easy to carry anywhere. Of course, the e-book is also equipped with various pictures, videos, animations that are very interesting. Third, the aspect of utilization, namely the aspect that assesses the validity of teaching e-books seen from the benefits of these teaching materials that can be obtained by students. an assessment on the utilization aspect obtained a value of 100%, the value was given by a teaching materials expert lecturer, meaning that from the aspect of utilization the e-book teaching developed has a very good category, this is because teaching e-books can add to students' knowledge, improve students' thinking skills, especially affective abilities, namely the hope that it can encourage students' attitudes to care about the environment. Then, teaching e-books provides as much knowledge as possible regarding the facts of the Qur'an and there are several verses of the Qur'an that explain the importance of protecting the environment. Validity test by teaching material expert lecturers from each aspect and assessment indicators carried out on the developed e-book teaching materials,

an overall score of 93.7% was obtained in the "Very Good" category, meaning valid and can be tested. Based on the validity test by teaching expert lecturers with the advice given is "the cover can be changed with an image that reflects the theme/material conveyed in it, it is necessary to add a model map to describe the scope of the material to be set aside, the instructions for use are more clarified, add the name of supervisor 1 and 2 in the product" for more details can be seen in Appendix 9. So in terms of the overall assessment of each aspect of e-book teaching materials, the validity test is carried out both from the appearance aspect, the usage aspect and the utilization aspect, there is a revision because the maximum score obtained is 93,7%. the improvements made by the researchers were in the form of editing the e-book, namely by adding components from the suggestions of teaching material expert lecturers.

2. Validity Test by Material Expert Lecturers. Based on the results of validity test research by material expert lecturers, in every aspect of material assessment in e-book teaching materials that are tested for validity, both in terms of material/content quality, learning quality aspects and linguistic aspects, there is still much to be revised, in material and also about the e-book teaching materials on the theme of environmental preservation, especially on the second indicator which must be revised so that the e-book teaching materials are better. Then, the results of the validity test by material expert lecturers after revision can be discussed from every aspect. First, the quality aspect of the material/content, namely the aspect that assesses the validity of e-book teaching materials seen from the quality of the material presented in e-book teaching materials with the theme of environmental preservation. The assessment on the material/content aspect obtained a value of 82.5%, this value was given by the material expert lecturer, meaning that from the aspect of the quality of the material/content the e-book teaching materials developed have a very good category, this is because it is in accordance with KI, KD and objectives learning on environmental preservation theme material, seen from the breadth and depth of the questions is appropriate, where the breadth of the material means that what is presented describes the many related materials in an environmental preservation theme that can be connected with everyday life, and in accordance with indicators of caring for the environment to empower environmental care attitude.
 - a. Fostering an attitude of caring for the environment in classrooms and schools, namely by displaying interesting teaching materials and content that is in accordance with KI and KD and the themes used, this e-book displays material in the form of audio-visual which explains the impact caused by environmental pollution and how to prevent it , as well as pictures related to environmental preservation efforts, there are animations that invite students to participate in environmental preservation efforts, fostering curiosity about what dangers will arise if students do not protect the environment around them, this e-book shows pictures , videos, animations, stickers and some questions that can increase students' curiosity about environmental pollution material. The hope is that after students' curiosity grows, it can encourage students to think critically and be able to move students to be sensitive to the surrounding environment. Provides a collection of questions related to the efforts made when viewing a dirty and neglected environment. This collection of questions invites students to empower an attitude of caring for the environment, featuring questions and illustrated case studies in the form of pictures and animated videos. Giving instructions so that students carry out the go green program (greening) in the school environment and where they live. The e-books displayed are

questions related to environmental conservation efforts, such as students being instructed to bring plants from their respective homes to be planted in school gardens as reforestation activities, providing facts about natural phenomena that occur due to pollution and providing case studies. about environmental pollution to students is displayed in the form of videos, pictures and also animations.

- b. Second, the aspect of learning quality, namely the aspect that assesses the validity of e-book teaching materials seen from the quality of learning obtained during the learning process using e-book teaching materials with environmental preservation material. Assessment on the aspect of learning quality obtained a value of 70%, this value was given by material expert lecturers, meaning that from the quality aspect of learning the e-book teaching materials developed had a good category.
 - c. Third, the linguistic aspect is the aspect that evaluates the validity of e-book teaching materials in terms of grammar and conformity with KBBI and EYD used in e-book teaching materials with environmental preservation material. An assessment of the linguistic aspect obtained a score of 100%, the value was given by a material expert lecturer, meaning that from a linguistic aspect the developed e-book material has a very good category, this is because the language used in e-book teaching materials has good grammar, in accordance with KBBI and EYD, language fluency and accuracy of terms and language suitability for junior high school level students' cognitive and affective thinking abilities, so that the language in e-book teaching materials can be digested properly by students and is easy to understand. Overall the results of the validity test by the material expert lecturer from 14 statement indicators consisting of 3 aspects namely the material/content quality aspect, the learning quality aspect, and the linguistic aspect, the material expert lecturer stated that the e-book teaching material developed had a score of 77.7% in the "Very Good" category, which means it is valid and can be tried out, with some suggestions given by material expert lecturers that have been corrected by researchers, this is to make e-book teaching materials very good teaching materials to use in the learning process. science learning.
3. Validity Test by Science Subject Teachers. In this study, science subject teachers were learning experts, so the assessment made by the teacher of the e-book teaching materials that were developed was more complex, covering all aspects, both in terms of the appearance of the teaching materials, the quality of the material/content and the quality of learning. In the learning process using e-book teaching materials, teachers and students will later become users of the learning teaching materials.

Based on several suggestions that have been presented on the results of research by science subject teachers, in each aspect of the evaluation of e-book teaching materials the validity test is carried out, namely aspects of the appearance of teaching materials, aspects of material/content and aspects of learning quality that have not been revised, because suggestions from science subject teachers emphasize the influence of e-book teaching materials when carried out in the process of learning activities and preparation in the learning process, while based on research and development objectives carried out by researchers, based on Borg and Gall's (2003) research steps carried out to stage product validation.

Then, the results of the validity test research by science subject teachers can be discussed from the aspect. First, the aspect of display of teaching materials is the aspect that assesses the validity of e-book teaching materials from the appearance of these teaching materials in terms

of appearance, the components are in the form of flipbooks/Electronic Books, pictures, supporting videos, animations adapted to the designs that have been made, suitability with material on the theme of environmental preservation, accuracy in choosing colors, pictures, videos, animations, voice actors, suitability in the use of the letters used and accuracy in using language according to the KBBI spelling in the E-Book teaching material. Assessment on the display aspect of the teaching materials obtained a value of 95%, this value was given by the science subject teacher, meaning that from the display aspect the developed e-book teaching materials have a "Very Good" category, this is due to the suitability of the e-book that has been made easy to use, easy to carry, can be accessed anywhere, can be stored and used. Then the slides contained in the e-book have a very attractive design for use in science learning, materials, videos, pictures and voice acting are designed according to the theme of environmental preservation, which uses a lot of green and blue colors which mean a clean and green environment free from environmental pollution and language suitability according to KBBI.

Second, the aspect of material/content quality is the aspect that evaluates the validity of e-book teaching materials with environmental preservation theme material. Assessment on the quality aspect of the material/content obtained a value of 90% of the value given by the science subject teacher, meaning that from the material/content aspect the e-book teaching materials developed were in a very good category. This is because it is in accordance with KI, KD and learning objectives on environmental preservation theme material, seen from the breadth and depth of the questions it is appropriate, where the breadth of the material means that what is presented illustrates the many related materials in an environmental preservation theme that can be connected with everyday life, while the depth of the questions means that the questions presented relate a detailed concept in an environmental preservation theme material that must be understood by students.

Third, the aspect of learning quality, namely the aspect that assesses the validity of e-book teaching materials seen from the quality of learning obtained during the process of science learning activities using e-book teaching materials on the theme of environmental preservation. Assessment on the aspect of learning quality obtained a value of 100%, this value was given by the science subject teacher, meaning that from the quality aspect of learning the e-book teaching materials developed had a very good category. This is because, the material in the e-book teaching materials is presented in an attractive appearance containing videos, pictures and explanations and the questions contained in the e-book can foster student curiosity, can trigger student activity, encourage students to look further for the questions contained in the e-book made with high-level cognitive thinking dimensions, namely C3 (Applying) and C6 so that students have their own challenges to solve problems regarding environmental pollution in the e-book teaching material questions from this e-book problem can also foster affective aspects, namely caring, students are given challenges to solve problems regarding environmental pollution while providing conscious action on environmental concern, cognitive abilities and affective abilities will both affect student learning outcomes.

Overall the results of the validity test by science subject teachers from 14 statement indicators consisting of 3 aspects namely aspects of display of teaching materials, aspects of material/content quality, and aspects of quality of learning, science subject teachers stated that the e-book teaching materials had the theme of environmental preservation to empower an attitude of caring for the environment that has been developed has a score of 94.6% in the "Very Good" category, meaning it is valid and can be tried out. Based on the results of the validity test

that has been carried out by three validators, namely teaching materials expert lecturers, subject matter expert lecturers and science subject teachers obtaining an average score of 92.9% overall indicating that the e-book teaching materials with the theme of environmental preservation to empower caring attitudes the developed environment has an A value, with the category "Very Good (Valid and can be tested)".

CONCLUSION

Development of teaching materials in the form of e-books with the help of professional flip pdf applications on the theme of environmental preservation to empower environmental care attitudes using research and development methods (Research and Development R&D) developing e-book teaching materials in the form of materials and questions adapted to indicators of environmental care attitudes This e-book teaching material is designed to foster a caring attitude towards the environment in students at school, namely by displaying interesting e-book teaching materials and the contents of the material that are in accordance with KI and KD and the themes used, foster curiosity about what dangers are posed if students do not take care of the environment around them by providing a collection of questions on e-book teaching materials related to the efforts made when they see a dirty and unkempt environment, giving command questions so that students carry out the go green program (greening) in the school environment and where they live, provide facts about natural phenomena that occur as a result of pollution and provide case studies on environmental pollution to students, after conducting this research the teaching material expert validator, material expert validator and science subject teacher expert validator stated that this e-book teaching material development research can used and tested on students, here the researcher limits the research to the validation stage.

The results of the validity test with each of the 16 questions can be seen that teaching materials expert lecturers gave a score of 93.7%, material expert lecturers gave a score of 77.7% and science subject teachers gave a score of 94.6%. Overall, based on the values obtained from each of these validators, it can be stated that the developed e-book teaching materials have an average score of 92.9% with the criteria of "Very Good" which means that it is valid and can be tried out in schools to improve attitudes. care for the environment of students in science subjects with the theme of environmental preservation.

Based on the research and development on teaching materials in the form of e-books with the help of professional flip pdf applications on environmental preservation that have been carried out, several suggestions are given as follows: For other researchers, further research is needed to develop e-book teaching materials in science learning by other theme material, with other learning. For school principals, it is expected to be able to motivate teachers and provide the facilities needed by teachers and students to create innovative learning teaching materials. For teachers, e-book teaching materials can be used as a reference for developing other more innovative teaching materials, which can improve students' affective and cognitive abilities, so as to improve student learning outcomes.

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