

The Development E-Book Balancing Ecosystem Based on Education Character for Students' Elementary School

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ABSTRACT

Elementary school students need to preserve nature by maintaining the balance of the ecosystem. Nature conservation efforts in protecting the ecosystem is one form of character education and knowing the feasibility of these media. This article was to develop a character education-based ecosystem balance e-book. This study used the research and development method of Borg and Gall theory which was only carried out with ten development stages consisting of research and information gathering; planning; develop preliminary form product; preliminary field test; main product revision; main field testing; operational product revision; operational field testing final product revision; dissemination and implementation. Data analysis used during development was descriptive analysis, percentage techniques, and classical completeness. In the validation stage the expert showed the average percentage value of material experts was 87%, media experts were 88.2%, linguists were 89.4% very feasible criteria. And the average practicality value is 3.55. Based on this, the products produced in this study are said to be suitable for use in learning.

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INTRODUCTION

Education is expected to develop ability and shape the character of students with dignity. Character is a characteristic of each individual which is shown by how to behave, how to behave, and work together in the family, school and community environment. Throughout history, throughout the world education has basically two purposes, namely to help humans be smart and smart and to help them become good human beings (Sukma et al., 2017).

This is in line with the statement that national education aims to develop the potential of the nation's children who are intelligent and humane (Lidyasari, 2014). If the cultivation of character education has been carried out from an early age, this will be a provision for children to live in society. Good character is one of the educational outputs that are currently needed in facing global challenges. Character is considered as the foundation or basis of students in social life. Cultivating character education should be carried out as early as possible so that the character will be ingrained in students from childhood.

In recent years, character education has received attention from scientists but there is no consensus on the content and structure of characters especially among children and early adolescents (Wang et al., 2015). Character education at primary school age has an important role in efforts to shape children's character. Character education begins in the family environment, then the school environment and community environment. With the character education, it is hoped that students can have a good attitude. Positive characters will produce good attitudes, negative characters will also produce bad attitudes. So that currently character education is a topic that is currently always being discussed because it is considered as a way to instill character in children. In school students, deviations often occur, including violence between students (Snyder et al., 2013). This shows that there is still a lack of character education in children. The complexity of problems related to character becomes our common concern (Ali Ramdani, 2014).

The role of the family, school and community environment is one of the factors that can influence the development of children's character. So that parents and schools must always communicate to provide character planting in children. Children really need the role of teachers and parents in character building efforts. People can carry out certain strategies in providing character education to children at home (Shubert et al., 2019). School is a means of studying, school is also a means of children in making social relationships with other school members. Character building in schools prepares students to socialize with a wider environment, namely the community environment (Shoshani, 2019). Schools should prioritize the element of character planting in every activity carried out both inside and outside the classroom. The character education that is inside can be integrated into existing learning activities in the classroom. Children have unique characters and have many characters that the teacher must develop (Rolina, 2014).

Along with the times that are currently in the era of the industrial revolution 4.0, it demands developments in the fields of science and technology. Especially in the field of education, it cannot be separated from the use of science and humans in the world. Nowadays we can easily get information and learn by taking advantage of technological advances. Technological advances in the last decade have revolutionized a person's reading experience (Jung et al., 2012). The current curriculum in elementary schools is the 2013 curriculum (Fahmy et al., 2015) which requires teachers to be creative and be able to take advantage of technology in learning (Kristyaningsih et al., 2015).

New technology creates great opportunities and new challenges when a library collection in the form of virtual books has grown (Aaltonen et al., 2011). Educational institutions expand the service of providing innovative learning products in accordance with technological advances (Waheed et al., 2017). With the integration of technology in learning, it is hoped that the quality of education will be able to compete in the international arena so that human resources in Indonesia can compete with other countries, including in embedding character education for children. The development of technology is running so rapidly that elementary school children have been able to take advantage of this technology. Technology has changed the way humans perceive the world.

One of the technological applications in learning is the existence of digital-based learning media, namely learning resources in the form of e-books. Electronic books are gaining popularity as reading material (Jones et al., 2011) so that currently the industry that produces e-books has developed (Armstrong, 2008). The introduction of digital platforms in providing children's experiences is important (Reich et al., 2019). The use of e-books is currently very popular in society because it is relatively easy to use and children have no difficulty using it. The use of e-books can help teacher present information and can help increase student productivity in learning. The use of e-books can train children to learn independently in developing their knowledge and this is the development of independent learning for children. When compared to reading printed books, reading e-books produces a

discourse that is dominated by children (Korat & Or, 2010). Reading behavior using e-books can increase the speed level in reading differently from reading using printed books (Huang & Liang, 2015). In addition, students can feel happy when learning by using e-books (Lai, 2015). E-books in their use for learning play a role in technological advancement in education, especially in elementary schools. Not only can students be championed in the classroom, e-books can also be championed by students outside the classroom, for example at home. And E-books can be stored in CD-Room, flash disk, or smartphone.

Whereas in previous research conducted by Sabtaningrum et al (2020) developed an integrated thematic e-book that focuses on multicultural education in order to build multicultural knowledge of elementary school students carried out on learning from home. This research will develop a thematic e-book on the theme of the ecosystem. This aims to provide knowledge related to ecosystems which is also contained in environmental education. This e-book also provides knowledge about the ecosystem around students and how students should be in the protection of ecosystems and the environment. Because as we know that today, our environment is experiencing very fast damage (Pérez-Rodríguez et al., 2017). Negative environmental changes can have a negative impact on the survival of both human, flora and fauna. The environment around us is the responsibility of all of us, but there are many activities that can damage the environment. This is a very important factor for a teacher to provide environmental education to their students (Valderrama-Hernández et al., 2017). Early teaching of students about environmental conservation that can be done to repair damaged environments. Environmental preservation efforts in elementary schools are provided through integrated environmental education in integrative thematic learning.

METHODS

Researchers developed a character education-based ecosystem balance e-book adapting from the Borg and Gall development model which consists of 10 stages. The steps are (1) research and information gathering; (2) planning; (3) develop preliminary form product; (4) preliminary field test; (5) main product revision ; (6) main field testing; (7) operational product revision; (8) operational field testing (9) final product revision; (10) dissemination and implementation (Bogh & Gall, 2003).

The location of this research in one of elementary school di East Java. The data obtained are qualitative data and quantitative data. Qualitative data in the form of suggestions, criticisms, responses and input as outlined in a questionnaire from the validator. The data obtained is related to the feasibility or suitability of the product and its accessories that have been developed for use in thematic learning. Quantitative data in the form of a percentage value obtained from a validation questionnaire compiled with a Likert scale (multilevel scale). The figures obtained range from number 1 to number 4. Data in the form of value scores are used as consideration for revision and assessing the feasibility of content, language, and product presentation. The resulting data will later be used as a measure of the validity of the character education-based ecosystem balance e-book which is developed and used for revision. Data collection techniques taken were observation, interviews, questionnaires and test questions.

The data analysis technique in developing character education-based ecosystem balance e-book is quantitative data. Quantitative data were obtained from assessment questionnaires given to material experts, media experts and linguists. For quantitative data analysis, the researcher develops eligibility/validity criteria in accordance with the developed instrument. The data analysis steps in this study were to analyze data from media experts, material experts and linguists and then analyze the data from the results of field tests.

Table 1. Instrument Rating Scale

Qualitative Data	Assessment
Very Good	3,51 – 4,00
Good	2,51 – 3,50
Less	1,51 – 2,50
Very Less	1,00 – 1,50

Table 2. Validity Criteria

No	Validity Criteria	Level of validity
1.	85,01%-100,00%	Very valid, or can be used without revision.
2.	70,01%-85,00%	Quite valid, or can be used but needs minor revision.
3.	50,01%-70,00%	Less valid, it is recommended not to use it because it needs major revisions.
4.	01,00%-50,00%	Not valid, or may not be used

RESULT AND DISCUSSION

The research conducted by the author is a type of research and development that produces a character education-based ecosystem balance e-book developed in fifth grade in thematic learning theme 5 (Ecosystem), sub-theme 3 (Ecosystem Balance).

1) Research and information collection

The results of reviewing the curriculum were the results of interviews with school principals and class V teachers. The curriculum used in the primary schools studied was the 2013 curriculum so that this development product received a positive response to be tested at the school. In addition, based on the results of field studies conducted by conducting interviews with teachers, researchers concluded that teacher learning uses learning resources in the form of textbooks from the school library but character education applications have not been seen much. In this product research and development, the material selection is based on the results of the learning syllabus analysis in the form of core competencies and basic competencies which are used as references in developing the product. The determination of the material based on the value on the thematic learning of ecosystem balance results in 60% of students who have not reached the completeness value.

Table 3. Value of Ecosystem Balance Thematic Learning

No.	Interval Value	Middle Value	The Frequency of Thematic Learning Outcomes
1.	31-40	35,5	1
2.	41-50	45,5	3
3.	51-60	55,5	2
4.	61-70	65,5	12
5.	71-80	75,5	2
6.	81-90	85,5	2
7.	91-100	95,5	1
	Jumlah		30

Based on the table above it can be presented that 18 students whose scores have not reached the minimum completeness (70) so there are learning problems that need to be given solutions.

2) Planning

Researchers examined the materials to be compiled in developing the product which included the following: (1) the basis for the development of this product was the determination of the curriculum. The curriculum used is the 2013 curriculum. The materials used are in Theme 5 (Ecosystem), sub-theme 3 (Ecosystem Balance); (2) the product developed is in the form of a character education-based Ecosystem Balance e-book that is structured in such a way that it can be used by students to learn independently and help develop student character. This thematic e-book consists of 3 subjects, namely citizenship, Indonesian Language and Science. Inside there are learning materials and examples of activities that contain character education.

3) Develop preliminary form product

Through the planning stage the researcher examines the materials to be compiled in developing a product which includes the following: the basis for developing this product is the determination of the curriculum, the product developed is in the form of a character education-based Ecosystem Balance e-book that is arranged in such a way that students can learn independently and help develop student character. In the initial product development stage, the researcher designed the initial design of the e-book Ecosystem Balance based on character education.

4) Preliminary field test

After the product has been developed, the next step is to test the initial field which aims to determine whether the e-book development product is valid or not, the character education-based ecosystem balance e-book development product. This trial phase is the expert validation stage. The following shows the data on the results of the trial questionnaire in Table 3 in the form of the acquisition of an assessment score of the validity of this character education-based ecosystem balance e-book from a questionnaire filled out by integrating thematic learning material experts.

Table.4 Data on Material Expert Validation Sheet Results

NO.	Assessment Aspect	TSEV	S-max	V (%)
1	Learning Objective	17	20	85
2	Presentation of the material	36	40	90
3	Effectiveness of E-Book Balancing Ecosystem Based On Character Education	22	24	91,6
4	Languages	13	16	81,25
Total		88	100	
Precentage (%)				87

From the presentation of the questionnaire results by material experts in Table 3, it can be concluded that the total score of the learning media has a percentage of 87% and is declared very valid.

Table.5 Linguist Expert Validation Result Data

NO.	Assessment Aspect	TSEV	S-max	V (%)
1	Learning Objective	18	20	90
2	A technical E-Book Balancing Ecosystem Based On Character Education	22	24	91,67
3	Effectiveness of E-Book Balancing Ecosystem Based On Character Education	20	24	83,3
Total		60	68	
Percentage (%)				88,23

From the presentation of the questionnaire result data by the e-book media expert on the balance of the character education-based ecosystem in Table 4, it can be concluded that the total score of the overall e-book balancing ecosystem based on character education is 88.23% and is declared very valid.

Table.6 Linguist Expert Validation Result Data

NO.	Assessment Aspect	TSEV	S-max	V (%)
1	Learning Objective	17	20	85
2	The use of Indonesian in the E-Book Balancing Ecosystem Based On Character Education	22	24	91,67
3	Effectiveness of E-Book Balancing Ecosystem Based On Character Education	22	24	91,6
Total		61	68	
Percentage (%)				89,4

From the presentation of the questionnaire result data by the e-book media expert on the balance of the character education-based ecosystem in Table 5, it can be concluded that the total score of the overall character-based environmental preservation of e-book balancing ecosystem based on character education is 89.4% and is declared very valid. Then the product revisions were made according to the advice of the expert validators. The following are the results of the product revisions according to the criticism and suggestions by the validators.

5) Main Product Revision

Based on the validation data that has been obtained, in addition to the assessments given, there are also some suggestions for improvements to the module before proceeding to a limited-scale trial. Suggestions and improvements that have been made are presented in Table 7.

Table 7. Suggestions and Results of Stage 1 Revisions

No	Suggested	Revisions Phase 1
1	The cover is made more attractive according to the theme	The cover has been created according to the theme
2	In some schools, it is necessary to provide space for student answers	A place has been assigned to the student to answer
3	The design is made more attractive in accordance with the characteristics of elementary school students	The design has been improved by adding pictures according to the material

4	Use of grammar to be more refined	Fixed rudimentary grammar fixes
5	The margins (outlines) must be uniform and balanced	The margins have been made uniform and balanced

Based on the suggestions that have been given by experts and practitioners, improvements have been made to several parts of the module which will be used in the next stage, namely the limited test.

6) Main Field Testing

The main field test aims to obtain a qualitative evaluation from users in the field on the basis of the product being developed which has been revised. The main field trial was carried out by a small group (student) test in the field with 10 student respondents to determine the feasibility of the product.

Table 8. Main Field Trial Questionnaire Results

No.	Aspect	Average	Category
The contents of the e-book			
1.	The material is easy to understand	3,20	Good
2.	The material is supported by clear images	3,30	Good
3.	Images on the material are accompanied by clear descriptions	3,20	Good
4.	Pictures are described in the material	3,50	Good
5.	Student activities are easy to do	3,40	Good
	Average	3,32	Good
Presentation			
1.	The appearance of the ebook is attractive and colorful	3,50	Good
2.	Title / caption in accordance with the theme	3,60	Very Good
3.	Pictures, tables, materials and so on are presented clearly and in color	3,60	Very Good
4.	Presentation of the module is able to develop students' reading interest	3,40	Good
5.	The presentation of the module is coherent and logical	3,20	Good
	Average	3,46	Good
Legibility			
1.	The presentation considers its meaning and usefulness	3,60	Very Good
2.	Engage students actively	3,30	Good
	Average	3,45	Good

Based on the results of the questionnaire on the main field test conducted on 10 student respondents, the average score on the aspect of the module content was 3,32 which means it is included in the "Good" category. The presentation aspect obtained an average value of 3,46 in the "Good" category, then in the legibility aspect the average value was 3,45 in the "Good" category. Based on the overall data obtained, it

can be concluded that the module product has good criteria even though there are still improvements and it is feasible to carry out the next field trial.

7) Operational Product Revision

Phase II product revisions are carried out based on the results of the main field tests with trials in small groups of students. Based on the results of the main field test, besides giving a questionnaire, students were also asked to provide input suggestions which would later be more helpful in improving the e-book.

Table 9. Suggestions and Revisions Phase II

No	Suggested	Revisions Phase II
1	Some of the pictures are still unclear.	Images are enhanced by providing more contrasting colors
2	Images are enhanced by providing more contrasting colors	The image is made attractive by providing a more contrasting color
3	Some students still found writing errors	The writing has been justified
4	In the material section students argue that the material is less clear due to lack of explanation.	The material has been clarified by adding explanatory sentences to make it easier to understand.
5	There are still problems in the e-book that are difficult to understand	The questions have been corrected and made in easy-to-understand sentences

The suggestions that have been given as a whole have been improved so that it can be carried out for the next stage of testing, namely operational field trials.

8) Operational Field Testing

The operational field test was carried out using a class consisting of 30 students. The data obtained at this stage is the fifth grade student learning outcomes data in thematic learning theme 5 (Ecosystem), sub-theme 3 (Ecosystem Balance) using e-books and e-book assessment data by students.

Table 10. Value of Thematic Learning Outcomes Using the E-book

No.	Interval Value	Middle Value	The Frequency of Thematic Learning Outcomes
1.	31-40	35,5	0
2.	41-50	45,5	0
3.	51-60	55,5	1
4.	61-70	65,5	5
5.	71-80	75,5	10
6.	81-90	85,5	9
7.	91-100	95,5	5
	Jumlah		30

Based on the table above it can be presented that 24 students (80%) have passed the minimum competency set by the school. Assessment of the module by students is carried out using a questionnaire.

Table 11. Results of the E-book Assessment Questionnaire by Students

No.	Aspect	Average	Category
The contents of the e-book			
1.	The material is easy to understand	3,40	Good
2.	The material is supported by clear images	3,70	Very Good
3.	Images on the material are accompanied by clear descriptions	3,40	Good
4.	Pictures are described in the material	3,70	Very Good
5.	Student activities are easy to do	3,50	Good
	Average	3,54	Good
Presentation			
1.	The appearance of the ebook is attractive and colorful	3,60	Very Good
2.	Title / caption in accordance with the theme	3,70	Very Good
3.	Pictures, tables, materials and so on are presented clearly and in color	3,60	Very Good
4.	Presentation of the module is able to develop students' reading interest	3,60	Very Good
5.	The presentation of the module is coherent and logical	3,50	Good
	Average	3,60	Very Good
Legibility			
1.	The presentation considers its meaning and usefulness	3,70	Very Good
2.	Engage students actively	3,50	Good
	Average	3,60	Very Good

Based on the results of the questionnaire on the operational field testing conducted on 30 student respondents, the average score on the aspect of the module content was 3,54 which means it is included in the "Good" category. The presentation aspect obtained an average value of 3,60 in the "Very Good" category, then in the legibility aspect the average value was 3,60 in the "Very Good" category.

9) Final Product Revision

Final Product Revisions or Phase III Revisions are carried out based on the results of operational field trials. Based on the results of field trials by conducting learning using products, there were several suggestions from students for improving the final module before the module entered the distribution stage.

Table 12. Suggestions and Revisions Phase III

No	Suggested	Revisions Phase III
1	In the questions in the e-book, students still find it difficult.	Written questions based on the taxonomic level of bloom
2	The image used is still unclear.	The image has been sharpened using a more contrasting color
3	There are some terms that are still difficult to understand	Some terms have been changed for easy understanding

Based on the results of criticism and suggestions given by students, the e-book has been improved, so that it can be continued at the next stage, namely the dissemination stage.

10) Dissemination and Implementation

The dissemination and implementation stages are the final stages of research and product development. The revised module is then distributed to the teachers for feedback. Beside that in dissemination and implementation stages, researchers publish scientific papers in reputable journals so that research and development of character education-based ecosystem balance e-book products can be accessed by a wide audience, especially in the world of education.

The results showed that learning media in the form of e-books received positive responses from experts and students so that their existence was increasingly favored by children in supporting the learning process (Jones et al., 2011). Based on a questionnaire given by students with instrument items given, students feel happy (Lai, 2015) when learning using e-books. In addition, students' lives now that are close to technology provide good benefits when learning is also integrated with technology. This resulted in students being able to easily operate e-books (Korat & Or, 2010). In addition, this e-book is also equipped with character education so that reading, understanding and applying examples of good character application from this book will also have a good impact on children's character development. This is in line with the goal of national education which is not only to make people smart but also humane, which means humans who have good character (Lidyasari, 2014)

The results of this study can be used as a learning resource for elementary school students, especially in fifth grade with the Ecosystem theme and with the Ecosystem Balance sub-theme. The results of this study indicate that the ecosystem balance e-book shows valid results and is suitable for use by elementary school students. In addition, the material in the ecosystem balance e-book is in accordance with the characteristics of elementary school students, according to the existing curriculum and has an attractive design for students. This e-book is easy for elementary school students to understand and the language is straightforward and clear. The results showed that the e-book has a high practical value, so it can be concluded that the e-book of ecosystem balance has good criteria for use in learning elementary school students.

The findings in this study are different from previous studies conducted by Kristyaningsih et al (2015). Because in this study focused on development for elementary school students so that the use of language, designs and images used adjust to the characteristics of elementary school students. Further research conducted by Sabtaningrum et al. (2020) reported that the media developed was in the form of an integrated thematic e-book that focused on development materials on multicultural education. Whereas in this study focused on thematic e-books for fifth grade elementary school students on the theme of Ecosystems and the sub-theme of Ecosystem Balance. The purpose of developing the e-book in this study is to facilitate student learning both at school and at home. Due to the nature of e-books that are easy to use and practical to use, they are expected to make it easier for students to learn.

CONCLUSION

The results of the character education-based ecosystem balance e-book test showed the average feasibility of material and media experts, teachers, and students.

Material experts showed a percentage of 87%, while media experts gave an eligibility rate of 88.23%, linguists gave a percentage of 89.4. Of the three experts stated that the e-book learning media product which is based on ecosystem balance based on character education has a high worth. In the operational field trial the feasibility of the e-book was obtained from the results of the validation carried out by students which was carried out on 36 student respondents. Based on this assessment and the results that have been improved based on the criticism of the suggestions from each test, it can be concluded that the integrative thematic e-book on ecosystem balance is in the "Good" category and its feasibility has been tested.

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