

DEVELOPMENT E-BOOK OF FLIPBOOK TYPE ON ENVIRONMENTAL CHANGE MATERIAL TO TRAIN SCIENCE LITERACY GRADE X HIGH SCHOOL

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Abstract

E-book type flipbook is an excellent learning media to be used as teaching material because the design displayed can attract the attention of students. This e-book type of flipbook also helps students to learn biology, especially the subject of changes in class x high school environment. This study aims to develop a flipbook type E-book on environmental change material as a biological learning material that has been tested theoretically and empirically. Theoretical feasibility uses validation attachments which are assessed from the validator of the material expert and the scientific literacy expert. This e-book type of flipbook refers to the scientific literacy indicator from the 2009 version of the Pisa which has 3 points namely a) explaining the phenomenon scientifically b) identifying scientific issues c) interpreting data and evidence scientifically. While empirical eligibility is assessed from the readability test and response questionnaire. This research method uses the concept of Hannafin and Peck. Hannafin and Peck's concept uses the stages of analysis, design, development, and implementation. The analysis and design phase is carried out July-December 2019 at SMA Muhammadiyah 4 Surabaya and the Biology Department, FMIPA UNESA. The implementation phase was carried out on April 24, 2020, with the trial of 20 grade X students of SMA Muhammadiyah 4 Surabaya. The research instrument used a Likert scale for the validation sheet, Fry chart for the readability test sheet, Guttman Scale for the student response questionnaire test sheet. The data obtained were analyzed with quantitative descriptions. The results of this study indicate that the flipbook type e-book on environmental change material is theoretically feasible based on the validity sheet assessed from the material expert validator and the scientific literacy expert. The validity results showed an average of 88.27% of the very feasible categories. Besides that, the empirical feasibility test uses a readability test and student questionnaire responses. In the readability test results using the fry graphic shows, all the subchapters entered in level 10 categories. Then in the results of the questionnaire test the students' responses in the Guttman scale test showed an average of 93% of the excellent category

Keywords : e-book, environment change, science literacy

INTRODUCTION

Some studies use environmental change material for the development of textbooks which do not completely explain the material for environmental change. Examples such as in research conducted by Anggraini (2019) In SMA Negeri 1 Purwosari Kediri, entitled Theoretical Feasibility of Textbooks on Environmental Change Material Based on Collaborative Learning Class X High School to Practice Science Literacy Skills. In the development of textbooks on environmental change materials, the contents of the submission are only about pollution and environmental prevention. The development of textbooks should have material definitions of environmental change, factors in the occurrence of

changes in the environment, waste recycling. Thus, research is needed on the development of media that uses complete environmental change material. Besides, the results of research by Hayati (2016) in SMA Negeri 1 Sampang Madura have also developed textbooks on the environmental change that have the characteristics of a full-color book, a summary, and a glossary that helps facilitate student understanding. However, textbooks are only printed books. Learners need books that are easily accessible such as e-books that can be opened via Smartphone, laptops, and computers.

The media which is suitable for supporting environmental change material is the flipbook type e-book media. In contrast to ordinary e-books that only contain text and images. Flipbook type e-book media can add a

transition, text, photo, and video effects. This transition effect adds to the appeal of the e-book so it doesn't look stiff. Flipbook media is needed in the current era.

Media e-book type flipbook by the advice of the Ministry of Education and Culture which uses textbooks in digital versions of schools which are finally called Electronic School Books (BSE). The file can be downloaded on the website of the Ministry of Education and Culture (Ministry of National Education, 2007).

In the matter of environmental change, there is an element of science. This means that environmental change material contains aspects of scientific attitudes called curiosity, conscientiousness, cooperation, honesty, respect for the opinions of others, and open thinking about even new phenomena. As Suryaningsih (2017) said, Biology is a part of science in everyday life that cannot be separated from research that utilizes a scientific approach to the application of more complete life material.

Flipbook media is the most important component in learning. The availability of relevant flipbook will help the teaching and learning process in schools. If the e-book media of this type of flipbook will be used in environmental change material, it will certainly support learning in schools with a note that the display design must be interesting. In this case, supported by Suciati's research. (2014) e-book type flipbooks can support the birth of science learning device products. Because e-books type flipbooks affect aspects of scientific literacy. The intended scientific literacy is that students can understand the knowledge learned from the media used. So, the teacher will act as a facilitator to help students from material that is less understood. Because some facts in other studies by Ruci (2020) in SMA Negeri 1 Gedeg Mojokerto show that the material for environmental changes in biology lessons in schools has not been directed to practice scientific literacy and critical thinking.

Development of on environmental change material to practice class x high school science literacy that can be used in biology class x high school subjects. Adjusted in the basic competency obligations of 3.11 high school biology class X subjects, namely Analyzing data on environmental changes, their causes, and their impact on life.

Based on this study, the researcher finally made a flipbook type e-book on environmental change material to practice theoretical and empirical feasible class x literacy science by describing its feasibility.

METHOD

This type of research is the development of media that involves Hannafin and Peck's models whose stages

include the stages of analysis, design, development, implementation (Bradbury, 2018). The analysis and design phase was carried out July-December 2019 at Muhammadiyah 4 High School Surabaya and in the Biology Department, FMIPA UNESA. The implementation phase was carried out on 24 April 2020 with the trial of 20 students of class X IPA 3 of SMA Muhammadiyah 4 Surabaya.

Basic Development of this flipbook uses the type of scientific literacy from the Lau 2009 Pisa scientific literacy indicator. Where there are 3 points, namely 1) Explaining the phenomenon scientifically. 2) Identification of scientific issues. 3) Interpret data and evidence scientifically (Lau, 2009). The three points are outlined with 6 features of scientific literacy in e-books of flipbook types, namely: Link Biology (Libio), Task Overview (Segas), Overview Information (sefo), Quotes, and Biology experiments (Biomen). This e-book type flipbook can be accessed online by clicking on the URL link address provided. This flipbook type is used to study environmental change material in biology x grade high school books.

The theoretical aspects are calculated from the components of presentation, content, scientific literacy, and language. From the results of expert validation, they are lecturers in the field of scientific literacy, and material on environmental change. The instrument used was a validation sheet. The resulting validity data were analyzed by quantitative descriptive, then wrote a score of 1-4 using a Likert scale. Flipbook e-books are called valid if they get a percentage of eligibility $\geq 70\%$. Empirical aspects are calculated from the readability analysis and the results of students' questionnaire responses. First, the instrument used to use the fry chart for readability analysis is called valid if the readability of flipbook type e-books is at level 10, meaning that the e-book will be suitable for teaching materials of 10th grade. Both instruments were used using student questionnaire responses sheets which were formulated using percentages from the "yes" or "no" category using the Guttman scale with percentage score criteria (%) 0-24 (Not good), 25-49 (Not good), 50 -74 (Good enough), 75-84 (Good) and 85-100 (Very Good). Where the E-book is considered feasible if the percentage score of $\geq 75\%$ in the minimum good category.

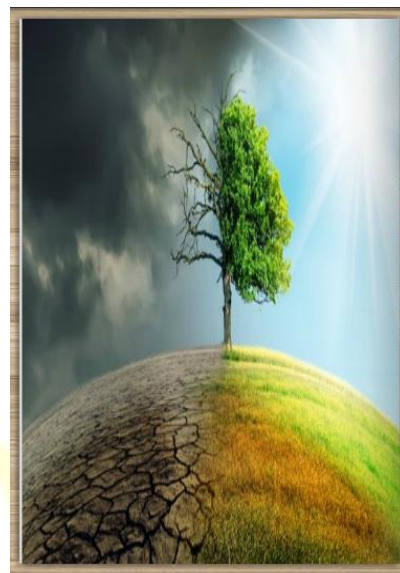
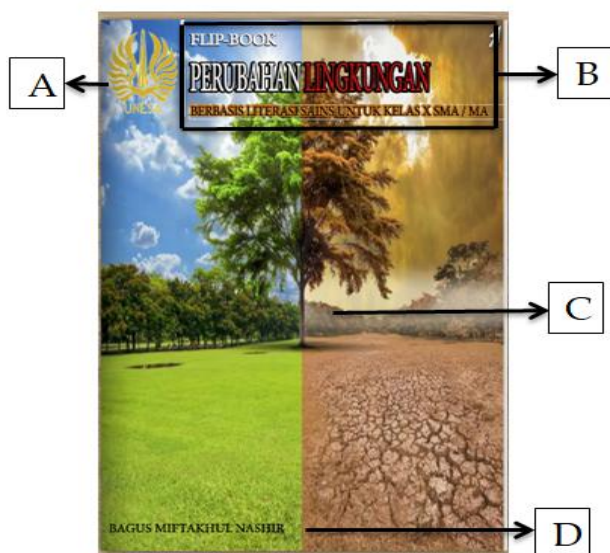
RESULT AND DISCUSSION

This research produced a learning tool called e-book type flipbook on the material changes in class x high school environment. This e-book has been tested for feasibility in theoretical and empirical aspects. E-books that are made have various features. There are 5 features

created a) Libio feature that contains the URL link address. B) Segas feature which contains task instructions for students. c) Sefo features new information about scientific studies in the form of short articles or videos. D) quotes feature that contains wise sentences to motivate students. E) Biomen features containing scientific research activities. Then, the design of the flipbook type e-book cover can be seen in table 1.

Table 1 Flipbook type ebook product

Front Cover Display



Information :

Link address URL flipbook type ebook

<http://online.flipbuilder.com/hyay/zatd/mobile/index.html#p>

Information :

- A. UNESA Logo
- B. E-book title
- C. Picture of a half tree
- D. Writer's Name

Back Cover Display

Display Table Of Contents Per Sub Chapter



Information :

- Sub Chapter 1 Environmental Changes
- Sub Chapter 2 Natural Factors Of Environmental Change
- Sub Chapter 3 Factors of Human Involvement In Environmental Change
- Sub Chapter 4 Waste Recycle

Display 6 Science literacy features



Information :

Contains url link addresses that can be visited to increase knowledge related to the material being studied. This feature is included in point 1,2,3 of Lau's 2009 scientific literacy.



Information :

Contains task instructions done by students to practice understanding the material. This feature is included in point 2 of Lau's 2009 scientific literacy.



Information :

Contains new information about scientific studies in the form of short articles or videos to add insight from related material. This feature is included in point 1,2,3 of Lau's 2009 scientific literacy.



Information :

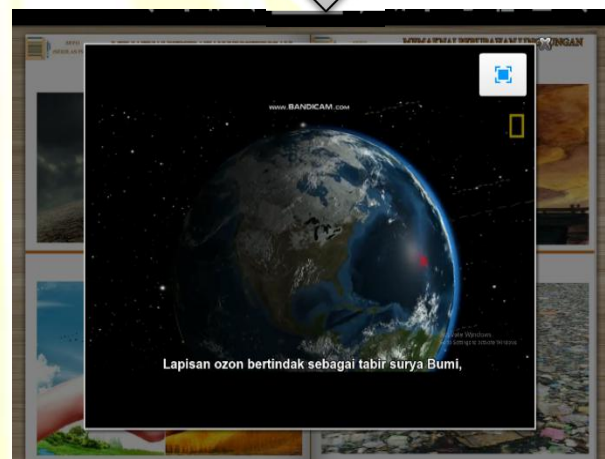
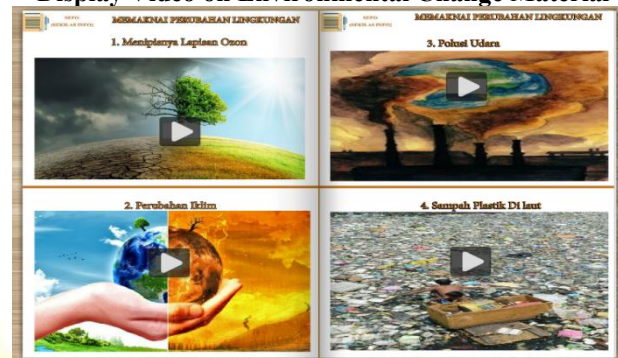
Contains wise sentences to motivate students. Features are not included in the point of scientific literacy but only as good advice for students..



Information :

Contains scientific research activities. This feature is included in point 1,2,3 of Lau's 2009 scientific literacy.

Display Video on Environmental Change Material



Information :

Videos that have not been played and have been played..

This flip book is part of a learning device made from this type of multimedia technology. It can be accessed digitally both online or offline. The way to access if online is enough to use the URL link address that has been provided while for the offline-only asks for the file that has been given.

Table 2. Assessment Rubric

Indicator of scientific literacy	Score	Information	Validation Sheet Results
Referring to PISA Science literacy (Lau, 2009) a) Explain phenomena scientifically b) Identification of scientific issues.	1	Less	E-books cannot be used
	2	Enough	E-books must be revised slightly.
	3	Well	E-books must be many

c) Interpret scientific data and evidence.	4	Very good	revised. E-books can be used without revisions.
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In Table 2 the assessment rubric above describes the indicators of scientific literacy, scores, information, and the results of the validation sheet. The assessment rubric is used as the basis for the assessment in the validation appendix which is filled in by 2 validators such as lecturers in the field of scientific literacy and the material field. The theoretical feasibility is examined by the aspects of presentation, content, language, and components of scientific literacy. The following are the results of the validation of flipbook type e-books in table 3.

A. Results of Attachments Validation of flipbook type e-books.

Table 3. The Validation Of Flipbook Type

No	Component of Validity	Score		Percentage Average (%)	Category
		V1	V2		
1	Presentation Component	4	4	100 %	Very Valid
2	Content Component	3,3	3,3	82 %	Valid
3	Language Component	3,1	3,1	77,5 %	Valid
4	Science Literacy Component	3,6	3,6	91,6 %	Very Valid
Average		3,5	3,5	88,27 %	Very valid

Information

V1 = Material Expert Validator

V2 = Science Literacy Validator

Based on table 3. The validity of flipbook type e-books.

The calculation is done using a Likert scale formula (Riduwan, 2012) expedience percentage (%) = $\frac{\sum \text{Skor total}}{\sum \text{skor maksimal}} \times 100 \%$ then the result is divided by 2 to be taken on average.

In the presentation component, 2 validators give an average score of 4, which at a percentage of 100% indicates a very valid category. That means the flipbook type e-book media are presented very well. Because in this presentation component there are covers, images, and videos that are relevant to the contents of the environment change material. Besides, the e-book presented is easily accessed digitally via smartphones and laptops.

In the content component, 2 validators gave an average score of 3.3, which was 82% with a valid category. This shows that the environmental change material presented is following the demands of basic competencies in the 2013 curriculum.

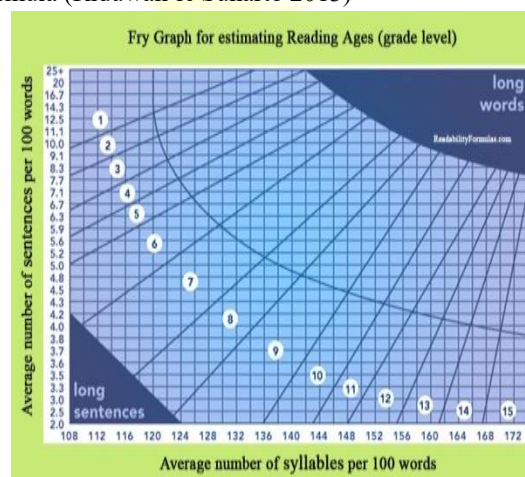
The linguistic component shows that 2 validators gave an average score of 3.1, which was at a percentage of 77.5% with a valid category. This means that e-books that are made have language that is easy to understand and standard. Besides that, the accuracy of the sentence structure is quite valid. According to Rahmawati (2019), E-book teaching materials can be called quite feasible because the language used is efficient in the sentence structure that matches the rules of the Indonesian language.

In the scientific literacy component, 2 validators gave an average score of 3.1, which was 91.6% with a very valid category. This is assessed based on the components of scientific literacy such as the existence of experimental assignments that lead students to think scientifically besides that there are also supporting features of scientific literacy such as libio features, segas features, sefo features, quotes features and features of Biomen. Where the supporting features of scientific literacy are all following the results of the elaboration of Pisa's scientific literacy indicators in 2009. It is supported by Zuriyanti (2011) That the features of the scientific literacy component can be related to the way students work, think, and solve problems. So it is enough to help practice scientific literacy skills.

B. The Validity Language flipbook

The feasibility of the flipbook type e-book is seen from the empirical aspect of the readability aspect of the flipbook and the students' responses.

Results Questionnaire level readability using the Fry formula (Riduwan & Sunarto 2013)



Gambar 1. Graphic Fry

Tabel 4. The Recapitulation Language Flipbook

Part	Page	Σ Sentence	Σ syllables	Level
Sub Chapter 1	4	6,3	256 x 0,6 = 159	10
Sub Chapter 2	8	6,3	259 x 0,6 = 154,2	10
Sub Chapter 3	19	6,3	267 x 0,6 = 160,2	10
Sub Chapter 4	27	6,3	260 x 0,6 = 156	10

Based on table 4 the recapitulation results of readability using the fry formula there are 4 sub-chapters which are calculated for eligibility. In sub-chapters 1, sub-chapters 2, sub-chapters 3 and sub-chapters 4. All of them show the same value, which is level 10. This means that e-books of flipbook types in this environmental change material are suitable for students studying in grade 10 high school. This is by the demands of the basic competence of biology subjects in environmental change material that is included in class x high school. (Permendikbud, 2018)

C. Validation Result of Student Responses Worksheet

Results of student response worksheets with Guttman scale calculations (Riduwan & Sunarto 2013)

Tabel 5. Recapitulation of Student Responses Worksheet

No	Aspect	Average Percentage	Category
1.	Concept Aspect	94 %	Very good
2.	Physical Aspect	92 %	Very good
Average		93%	Very good

From table 5, the questionnaire responses of students were distributed through an online questionnaire attachment for 20 class X students from Muhammadiyah 4 High School in Surabaya. 2 aspects are assessed namely in terms of concepts and physical aspects. In terms of presentation, the concept obtained an average percentage of 94% which is a very good category. While in terms of physical presentation an average percentage of 92% is included in the excellent category. The method of obtaining the score is seen from the results of the questionnaire attachments that have been distributed to 20 students. In the aspect of presenting concepts that contain 14 questions with a choice of yes or no score. Then in the physical presentation aspect contains 7 questions in the

answer option yes (score 1) or no (score 0) according to the Guttman scale score criteria (Riduwan and Sunarto, 2013). In the formula average percentage = $\frac{\Sigma \text{Number Of Student who Answered yes}}{\Sigma \text{Number Of Student who responded}} \times 100 \%$

The results of this percentage are categorized in the students' response score criteria. Percentage score (%) 0-24 (Poorly), 25 – 49 (Deficient), 50-74 (Good enough), 75-84 (Good), 85-100 (Very good). So that e-books of this type of flipbook can be called feasible because they have obtained at least a good category at a percentage of $\geq 75\%$.

CONCLUSION

From the research that has been carried out this resulted in the learning media of flipbook type e-books on environmental change material in biology class x high school. Of course, the feasibility has been officially tested in the recapitulation of validity with an average of 88.27% the category is very feasible. then in the proof of the feasibility of the analysis of the readability of the calculation of 4 sub-chapters all of which indicate level 10 which means this e-book is suitable for grade X students according to the formula of the fry chart. Considered from the Appendix questionnaire, students' responses showed an average of 93% very well according to the Guttman scale calculation.

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