

## Development of E-Booklet Learning Media in the Topic of Environmental Pollution for Junior High School Students

Avrina Erawati<sup>1</sup>, Laily Yunita Susanti<sup>1\*</sup>

<sup>1</sup> Kiai Haji Achmad Siddiq Islamic University Jember, Jember, East Java, Indonesia

\*E-mail: [susantilaily89@gmail.com](mailto:susantilaily89@gmail.com)

### Abstract

Environmental Pollution Material is one of the science learning materials with conceptual and factual characteristics. In this regard, the Astra Nawa Superior Middle School explained that the environment was polluted so that observations could be made. There are obstacles in learning science at Astra Nawa Superior Middle School, namely, the lack use of variative learning media. The aims of this study were 1) to describe the validity of e-booklet learning media on Environmental Pollution material for junior high school students; 2) To describe student responses toward e-booklet learning media. The type of study is Research and Development with the ADDIE model (Analysis, Design, Development, Implementation and Evaluation). The validation of the e-booklet learning media was from material experts and media experts consisting of science lecturers and teachers. Small-scale student response test, namely 6 students in a large-scale response test of 32 students. Based on the results of development research, it can be concluded that the average percentage of the validation test for material experts is 80.66%, media experts are 94.28% and science teachers are 95.29% with a very valid category. The results of the small-scale trial response obtained 85.47% and the large-scale trial obtained 86.56% with a very valid category, so that e-booklet learning media can be used in the learning process. According to the findings, it can be concluded that e-booklet learning media can be used in the learning process.

Keywords: Interactive learning, Lectora inspire, Learning media.

### INTRODUCTION

Natural science is a knowledge related to nature in the form of facts, concepts, and laws that have been tested for truth through scientific methods (Kadek Ayu Astiti, 2020). One of the natural science materials is Environmental Pollution which contains conceptual and factual knowledge. It is also concrete or real material that is directly in the context that connects directly with the environment. Therefore, several natural events which are the impact of environmental pollution that has occurred can be observed or shown to

students (Siti Saenab, 2018).

As Allah's word regarding the prohibition of polluting the environment and destroying nature in the Al-Qur'an surah Ar-Rum verse 41 with the meaning: "Corruption has appeared on land and at sea caused by the actions of human, so that Allah will inflict on them some of the (results of) their actions, so that they return (to the right path) (Al-Quran, 30: 41)."

Based on surah Ar-Rum verse 41 above, it is explained that all damages on earth is the result of human activities

that destroy nature. The impact of this damage will return to humans, so Environmental Pollution material conveys to students the consequences caused by a polluted environment and should provide appropriate actions to always protect the surrounding environment so that they do not participate in polluting the surrounding environment.

Environmental pollution is an environmental condition that is disturbed as a result of human activities or by natural processes. As a result, the quality of the environment decreases and it cannot function according to its designation.

Booklet comes from two words, namely book and leaflet which means a sheet of paper that contains messages about information. Meanwhile, e-booklet is a booklet that is packaged in an electronic format so that they can be accessed through technological devices such as cellphones and computers (Nur Ika Amalia, 2020). E-booklets are learning media that have a display of content that is more dominant in images than writing, and there is audio and video to explain something briefly (Sadiman. AS, 2009). In addition, there are criteria and components of booklet learning media according to the National Education Standards Agency (BSNP) which include components of eligibility for content, presentation, language (Fajarini, 2018).

E-booklets are created using Microsoft Word and Flip PDF Corporate Edition software. Microsoft Word was chosen as the software for the initial development of the content section in the form of typing in

the material and adding pictures/photos in the e-booklet before being processed into Flip PDF Corporate Edition to produce Hypertext Markup Language (HTML) which can be opened via electronic media such as smartphones and computers.

It is also reported that the research on developing e-booklet based on environmental pollution has not been widely carried out, especially at the junior high school level. Another research also focused on the sub-material on waste management or environmental preservation and has been carried out at the SMA/MA level (Kandela, 2021; Frianti, 2022). Therefore, research on the development of environmental pollution-based e-booklets needs to be carried out.

Based on the results of interviews with science teachers in seventh grade at one of the schools, especially at SMP Unggulan Astra Nawa, the teacher has only used printed media in the form of student science textbooks (K-13 revision 2016), the textbooks are school loans, used in ongoing the learning process then the textbooks are returned to school if the learning activities are over so students cannot study properly. Therefore, science learning activities are considered ineffective due to the lack of varied media to attract students who are enthusiastic about learning and the use of science textbooks which are considered boring and have never used electronic-based learning media.

Based on the results of the questionnaire analyzing the needs of students at SMP Unggulan Astra Nawa, the percentage related to students' statements regarding

science subjects was obtained, namely, 75% stated that they were happy and interested in science lessons, however, 83.3% stated that science lessons were difficult to understand and 83, 3% of students are less motivated and not enthusiastic about learning science; 83.3% of students stated the need to use media that displays lots of images in science learning and 91.7% stated that they needed the use of interesting electronic media in the learning process.

Through a questionnaire analysis of the learning styles of students at SMP Unggulan Astra Nawa, it was obtained that 91.7% preferred learning by looking at pictures and 91.7% stated that they preferred to read texts that contained pictures and preferred to pay attention to pictures rather than writing, and participants students stated that 91.7% agreed to use media that displayed lots of pictures and photos so that it could help in mastering learning material well.

In this study, e-booklet media was developed, which was dominated by presenting lots of pictures and personal documentation through learning resources around the polluted environment at Astra Nawa Superior Middle School and various reference materials (science teaching materials for SMP K-13). This is because around the school, it presents an unhealthy or polluted environment, including a canal that is directly opposite the school environment, for example, there is often a lot of household waste, both organic and inorganic. In addition, there are markets and densely populated settlements around the school environment, as well as on the

streets which are filled with vehicle fumes and agricultural waste, namely, chemicals and waste from rice fields (insecticides).

Thus, the existence of e-booklet media can make it easier for students to learn Environmental Pollution material anytime and anywhere. Based on this description, it can be concluded that the development of e-booklet media needs to be done to overcome the availability of learning media in schools.

## METHODE

The type of research used in this research is the type of Research and Development. This method is a research method used to produce new product designs, test the effectiveness or validity of existing products (so that they become more practical, effective, and efficient), as well as describe and create new products (which have never existed before). This research used a model developed by Robert Maribe Brach, namely the ADDIE model which consists of analysis, design, development, implementation and evaluation (Sugiono, 2019).

The selection of the ADDIE development model was adjusted based on the needs of the development of learning media, the limited research to the third stage, namely implementation. Meanwhile, the evaluation stage was ~~carried out formatively in each of the three stages~~ due to the limited time of the research. Kirkpatrick and Craig (1970) explained that evaluation is the most strenuous and time-consuming process.

The reason for selecting the ADDIE

development model is that contains a procedural model in gradual steps and simple, systematic and easy to apply in the development of learning media. Furthermore, the subjects of this research trial consisted of 1 material expert lecturer and 1 media expert lecturer, 1 science teacher and junior high school students as respondents.

The stages of developing the e-booklet learning media can be described as follows, 1). The analysis phase includes the implementation of performance analysis in the form of analyzing problems that exist in schools related to learning media, analysis of needs analysis to determine the learning media needed by students and researchers giving questionnaires in the form of analysis of the needs of learning media e-booklets, concept analysis based on space scope of material by identifying the concepts needed.

Concept analysis is carried out in two stages, namely formulating curriculum, indicators, learning objectives and compiling materials that need to be taught using e-booklet learning media, Analysis of student characteristics was carried out to determine the characteristics of junior high school students related to cognitive abilities according to the period of their thinking development. This analysis was carried out by observing the distribution of questionnaires related to student learning styles.

In the design stage, several things were carried out at the design stage which included the preparation of learning materials, media selection, initial

design, and instrument design. The data collection instrument used in this research was a questionnaire used to measure the validity level of e-booklet learning media developed. The questionnaire used in this study is in the form of a checklist with an assessment of scores on each aspect using a Likert scale of 1-5 (Sahlan, 2015).

The development stage includes material expert validation and media expert validation. Furthermore, the implementation stage aims to determine student responses to the attractiveness, quality and use of e-booklet learning media which have been validated by material experts, media experts, and science teachers. The e-booklet learning media is then tested on a limited basis to students in Astra Nawa junior high school.

Limited scale trials, by giving small-scale and large-scale student response questionnaires toward the e-booklet learning media that have been developed. The small-scale students' responses consisted of 6 students in seventh grade, while the responses of large-scale students were a combination of students in seventh and eighth grade which consisted of 12 students in class seventh and 20 students in class eighth, so that the total number of students in the large-scale trial was 32 students.

After obtaining the research data, the next step is data analysis. Data obtained from validation sheets and student response trials will be analyzed using percentage analysis techniques. The data processing formula for each aspect assessed by the validator is as follows:

c. Development

At this stage it is carried out in two steps, namely expert appraisal (1) followed by revision and (2) limited trial. The objective at this stage is to produce the learning media after going through revisions and suggestions from experts and data from the trial results.

Quantitative data obtained from validation questionnaires from validators were analyzed using the calculation of the average formula score (Akbar, 2016) as follows :

$$V - ah = \frac{TSe}{TSh} \times 100\%$$

Information :

V-ah = Expert validation

TSe = Total score empirical which is obtained from expert judgment

TSh = Total expected score

Furthermore, all of the percentage data obtained is converted into descriptive quantitative data using validity criteria. There are validity test criteria for learning media (Akbar, 2017). The validity test criteria are shown in Table 1 as follows:

**Table 1.** Validity Test Criteria

Criteria Validity	Validity Level
85.01% - 100%	Very valid or can used without revision
70.01% - 85.00%	Valid or usable but necessary small revision
50.01% - 70.00%	Invalid, it is recommended not to use it because it needs major revisions
01.00% - 50.00%	Invalid or not used

The percentage data processing formula adapted by Akbar (2017) for each aspect assessed by students is as follows:

$$V - au = \frac{TSe}{TSh} \times 100\%$$

Information :

V-ah = Validate audience percentage

TSe = Total score empirical which obtained from student responses

TSh = Total expected score

There are criteria for the results of student responses to e-booklet learning media which can be seen in the table 2 below.

**Table 2.** Student Response Results Criteria






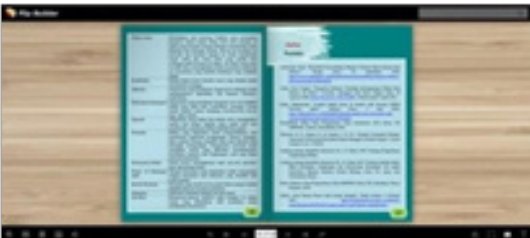

Criteria Validity	Validity Level
81.00% - 100.00%	Very valid or can used without revision
61.00% - 80.00%	Valid or usable but necessary small revision
41.00% - 60.00%	Less valid, it is recommended not to use because it needs major revision
21.00% - 40.00%	Invalid or not used
00.00 - 20.00%	Strongly invalid – should not be used

**RESULTS AND DISCUSSION**

The research phase began with a needs analysis, and it was found that 83.3% of students were less motivated and not enthusiastic about learning science; 83.3% of students stated the need to use media that displays lots of images in science learning and 91.7% stated that they needed the use of interesting electronic media in the learning process.

In the concept analysis, the curriculum applied at SMP Astra Nawa is the 2013 curriculum with the revision. The concept analysis in question is Core Competence, Basic Competence, indicators and learning objectives based on Environmental Pollution material which will be developed according to the 2013 curriculum, namely

Table 3. Draft E-Book

Page View	Information
	Cover in the first page
	This page contains preface and instructions for using e-booklet learning media
	This page contains curriculum, learning objectives and table of contents
	This page contains an introduction and definition of environmental pollution
	This page contains soft skills and a glossary
	This page contains a reference
	This page includes the final page which contains the author's profile

Competence Basic 3.8 Analyzing the occurrence of environmental pollution and its impact on ecosystems and Basic Competence, and 4.8 Writing about the idea of solving pollution problems in the environment based on observations.

In the analysis of student characteristics based on the results of a questionnaire, a percentage was obtained which indicated the suitability of e-booklet learning media for the learning styles of students who had a tendency for visual learning styles. It is known that students have a visual learning style (learning by seeing) 71%, an auditory learning style (learning by listening) 16%, and a kinesthetic learning style (learning by moving) 13%.

After the analysis phase is complete, it is continued with the design stage. At this stage, there are several activities carried out in making e-booklet learning media (Table 3), including, a) compiling learning materials, b) choosing media, c) choosing e-booklet learning media formats, namely : cover; foreword; instructions for using the e-booklet; table of contents; list of Tables; list of Figures; preliminary; contents of e-booklets; Closing; References; author profiles, d) design expert test validation instruments and student response questionnaires. After completing the design stage, the e-booklet creation process is complete.

The next step is the development stage, the developed e-booklet learning media is then tested for validation by material experts, media experts, and science teachers to determine the validity of the e-booklet learning media). As for

the steps at this stage, the researcher gave a validation questionnaire to the validator to find out the deficiencies found in the e-booklet learning media. The responses and suggestions given by the validator can be used as a reference for carrying out product revisions. Expert validation consists of, 1 lecturer which includes material experts and 1 media expert; 1 teacher at School.

Based on the validation by the validator, the e-booklet learning media is a product that can be tested in the field. The first validation was carried out by material experts. The material expert validator was carried out by a lecturer who contributed to the field of chemistry. The results of validation by material experts can be presented in table 4.

**Table 4.** Material Expert Validation Results

Aspects	Validation Score
Relevance	26
Accuracy	26
Suitability of Servings with centralized learning demands on students	23
Presentation Method	19
Language	15
Readability and communicative	12
<b>Total Score</b>	<b>121</b>
<b>Percentage</b>	<b>80.66%</b>
<b>Criteria</b>	<b>Valid or usable but needs minor revision</b>

Based on the results of the validation by the material in table 4, the results in the form of a percentage reach 80.66% which indicates that this e-booklet learning media belongs to the valid category with several inputs as revisions. Material

experts provide feedback and suggestions, namely improving sentence structure so that it is easy to understand, adjusting word choices, improving the definition of eutrophication, adding clean water criteria and correcting typing errors.

After being validated by the material, then proceed to the validation stage by media experts. The media expert validator was carried out by lecturers in the field of instructional media.. The results of validation by media experts can be presented in Table 5.

**Table 5.** Media Expert Validation Results

Aspects	Validation Score
Learning	42
Communication	32
Convenience	20
Function	5
<b>Total Score</b>	<b>99</b>
<b>Percentage</b>	<b>94.28%</b>
<b>Criteria</b>	<b>Very valid or usable without revision</b>

Based on the validation results by the media in table 5, the results in the form of a percentage reach 94.28% which indicates that this e-booklet learning media belongs to the very valid category without revision so that e-booklet learning media can be used in the learning process.

The third validation, namely as a science teacher at Astra Nawa who analyzed the material aspects, language aspects, and graphic aspects. The results of the validation by the science teacher can be presented in Table 6.

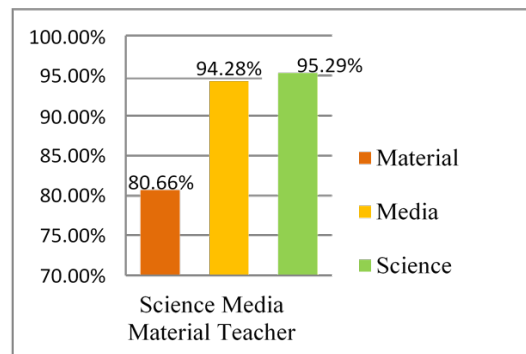
Table 6 shows the results of validation by science teachers of 95.29%. These results indicate that the validation test by science teachers is in a very valid category and e-booklet learning media can be used

in the learning process. the science teacher gave little response that, the material in the e-booklet learning media is in accordance with the competencies that must be mastered by students and the use of e-booklet could increase student learning interest.

**Table 6.** Science Teacher Validation Results

Aspects	Validation Score
Content	42
Language	9
Visualization	30
<b>Total Score</b>	<b>81</b>
<b>Percentage</b>	<b>95.29%</b>
<b>Criteria</b>	<b>Very valid or can be used without revision</b>

The results of the assessment by the validator can be shown in the graph as figure 1.



**Figure 1.** Expert Validator Rating Chart

Based on the graph in Figure 1, it shows that the validation results from material experts, media experts, and science teachers on e-booklet learning media are very valid to use with a few responses and suggestions from science experts and teachers as a revision of the e-booklet learning media.

Previous research on HOTS-based and Scientific Literacy-based booklets on environmental pollution material also has



a very valid validation percentage (88.3% and 97.5%) (Hasanah and Fitrihidajati, 2020; Syafitri, 2021). This indicates that the booklet is a suitable material for use in environmental pollution material.

The next step, namely the implementation stage, aims to determine student responses to the attractiveness, quality and use of e-booklet learning media that have been validated by material experts, media experts, and science teachers. The e-booklet learning media is then tested on a limited basis to students at Astra Nawa School by distributing questionnaires. The small-scale students' responses consisted of 6 students in class 7, while the responses of large-scale students were a combination of students in class 7 and 8 which consisted of 12 students in class 7 and 20 students in class 8, so that the total number of students in the large-scale trial was 32 students.

Data on calculating the results of small-scale trials by students through questionnaires on student responses to e-booklet learning media, the results of the assessment are calculated on average and produce a percentage value of small-scale trials of 85.47%, so that the overall results in the questionnaire are in a very valid category. The results of small-scale trials on e-booklet learning media can be used in the next stage of research, namely large-scale trials in the learning process.

The large-scale trials used the same procedures and questionnaires as the small-scale trials, the difference between the two tests was only the number of students who responded to the e-booklet

learning media. The data for calculating the results of large-scale trials, it is known that the average percentage value is 86.56%, so that the overall results in the questionnaire are very valid categories for use in the learning process (Figure 2).

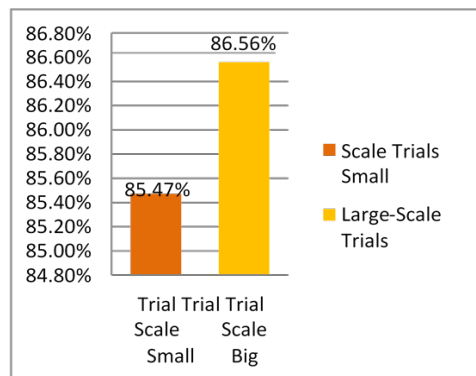


Figure 2. Graph of Small and Large Scale Trials

The results of small-scale and large-scale trials can be seen in Figure 2 which shows a very valid category so that e-booklet learning media can be used by students in the learning process and there is an increase in the percentage results from small scale to large scale, namely small scale of 85.47 % and 86.56% on a large scale. This percentage is based on the percentage criteria developed by Sa'dun Akbar (2015).

## CONCLUSION

The validation results for this e-booklet learning media contained responses and suggestions from the validator then revisions were made to improve the e-booklet learning media product and obtained a percentage score from the expert validator, namely material experts at 80.66%, media experts at 94.28% as well as from science teachers at 95.29%. Based on the results of the validation, the

e-booklet learning media is "very valid" to be tested and applied in the learning process. This e-booklet learning media meets the principles of good media to apply because the media is in accordance with curriculum, student characteristics, and contains elements of videos, pictures, quizzes and soft skills that can motivate students and create active and fun learning.

The results of student responses to e-booklet learning media were obtained in small-scale response tests, namely 85.47% and large-scale trials, namely 86.56%. This percentage is included in the "very valid" category based on the criteria that e-booklet learning media can increase student motivation because it is interesting and easy to understand.

## REFERENCES

- Akbar, Sa'dun. (2017). *Instrumen Perangkat Pembelajaran*. Bandung: PT. Remaja Rosdakarya.
- Ayu Astiti, Kadek, Yusniati M. H, Yusuf, & Joshua W., Adi, Kalendiwau. (2020). Pengembangan Bahan Ajar IPA Terpadu Tipe Connected pada Materi Zat Dan Karakteristiknya. *Jurnal Ikatan Alumni Fisika Universitas Negeri Medan*. Vol. 6, No. 4.
- Depertemen Agama Republik Indonesia. *Al-Qurandan Terjemahan*. (2014). Jakarta.
- Fajarini, Anindiya. (2018). *Pengembangan Bahan Ajar IPS*. Jember: Syair Gema Maulana.
- Frianti, N. (2022). *Pengembangan Media E-booklet Interaktif Sumber Energi Alternatif Berbasis Entrepreneurship Pada Mareri Pengelolaan limbah Untuk Siswa SMA* (Doctoral dissertation, Universitas Jambi).
- Hari Rayanto, Yudi & Sugianti. (2020). *Penelitian Pengembangan ADDIE dan R2D2 : Teori dan Praktek*. Pasuruan: Lembaga Academic & Research Institute.
- Hasanah, U., & Fitrihidajati, H. (2020). Pengembangan Booklet Berbasis Scientific Literacy Materi Pencemaran Lingkungan untuk Siswa Kelas X SMA. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, 9(3), 498-505.
- Ika Amalia, Nur, Yuniawatika, & Murti, Tri. (2020). *Pengembangan E- booklet Berbasis Karakter Kemandirian dan Tanggung Jawab Melalui Aplikasi Edmodo pada Materi Bangun Datar*. *Jurnal Kajian Teknologi Pendidikan* Vol. 3, No. 3.
- Kandela, I. S. (2021). *Pengembangan E-Booklet Berbasis Kearifan Lokal Di Kawasan Wisata Danau Kerinci Sebagai Bahan Ajar Pembelajaran Daring Pada Materi Pelestarian Lingkungan Kelas X Sma* (Doctoral dissertation, Universitas Jambi).
- Kirkpatrick, D. L., & Craig, R. L. (1970). *Evaluation of training. Evaluation of short-term training in rehabilitation*. USA: University of Wisconsin.
- Sadiman. A.S, dkk. (2009). *Media Pendidikan: Pengertian, Pengembangan, dan Pemanfaatannya*. Jakarta: PT. Rajagrafindo Persada.
- Saenab ,Siti, Ramlawati, & Suryani, Irma. (2018). Pengaruh Media Video dengan Pendekatan Kontekstual Terhadap Hasil Belajar IPA Kelas VII MTS Negeri Gantarang Kab. Bantaeng (pada Materi Pokok Pencemaran Lingkungan). *Jurnal IPA Terpadu* Vol.1, No 2.
- Sahlan, Moh. (2015). *Evaluasi Pembelajaran*. Jember: STAIN Jember Press.
- Sugiyono. (2019). *Metode Penelitian dan Pengembangan*. Bandung: Penerbit Alfabeta.
- Syafitri, Y. (2021). *Pengembangan Booklet Digital Berbasis HOTS Sebagai Media*

Pembelajaran Pada Materi Pencemaran Lingkungan Kelas VII MTSN 8 Tanah Datar. IAIN Batusangkar.

The second author is lecturer of Natural Science Education of Kiai Haji Achmad Siddiq Jember University.

### **BRIEF PROFILES**

The first author was born in Gresik, February 25<sup>th</sup>, 2000. Student of Natural Science Education Department of Kiai Haji Achmad Siddiq Islamic University. Graduated on 2021.