

Development of a Flipbook-Based Digital Pocketbook on Environmental Pollution Material on the Critical and Creative Thinking Skills of Class VII Students at SMPN 1 Sojol Utara

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ABSTRACT

Keywords:
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This study aims to develop and see the effectiveness of flipbook-based digital pocketbooks on environmental pollution material on the critical and creative thinking skills of SMPN 1 Sojol Utara grade VII students. The method used in this research is research and development (Research and Development) with 4D instructional design. This research was conducted on grade VII students at SMPN 1 Sojol Utara, totaling 40 students. The results of this study showed that: (1) The flipbook-based digital pocketbook developed obtained a percentage of 86.96% of the very valid category and for media practicality obtained a percentage of 80% of the practical category for use in science learning, critical thinking skills obtained a value of 70.83% in the critical thinking category (2) The ability to think creatively obtained a score of 84.37% with the category of creative thinking (3) The effectiveness of the book The flipbook-based digital pocket developed is very effective in improving students' critical thinking skills with an effect size value of 1.95 huge categories, (4) The effectiveness of the flipbook-based digital pocketbook developed is very effective in improving students' creative thinking skills with an effect size valueThe 1.95 categories are enormous. Based on the results of the development that has been carried out, flipbook-based digital pocketbooks can be a learning medium that can improve students' critical and creative thinking skills in science learning.



Introduction

The development of the world has entered the 21st century, marked by rapid advances in science and technology. Education is vital in preparing students to have 21st-century skills (Oktavia, Alfiriani, & Samudra, 2024). The development of the 21st century in the learning process requires the government to improve the quality of education. Namely, Schools as educational institutions must have four competencies: creative

thinking skills, critical thinking, communication, and collaboration (Almarzooq, Lopes, & Kochar, 2020).

Efforts must be made to improve education quality by focusing on 21st-century skill competencies that can be developed through science learning. In 21st-century science learning, teachers are challenged to associate science and technology content because technology can support the teaching and learning process if technology content is linked to learning.

Some information was obtained from the interview results of science teachers at SMPN 1 Sojol Utara, which showed that the average score of science subjects was still below KKM, which was 65. The average score has not reached the completion of 70. Students still do not understand the scientific concepts of science subjects because resources or materials are still inadequate, especially in terms of environmental pollution materials. In addition, one of the problems teachers face is the low level of students' critical and creative thinking skills in solving HOTS questions in science subjects due to a lack of practice in doing HOTS questions. So that when faced with high-level questions, students have difficulty solving them. Students are less able to solve problems that require in-depth analysis and evaluation and are less able to solve problems by expressing ideas and answers that are many and varied.

The low ability to think critically and creatively of students is also caused by the learning process being considered less effective in developing interests, talents, and potentials that exist in students. Students quickly get bored, and most play less attentively during learning. This is because the teacher only explains the material and refers to science subject books without being supported by engaging learning media, so students do not understand the material and eventually have difficulty answering science subject questions. This is because SMPN 1 Sojol Utara teachers, especially grade VII, still use learning with a teacher-centered lecture method without being supported by interactive and exciting learning media to help students better understand and clarify the learning material being delivered. In addition, based on these observations, teachers still experience confusion and difficulties in determining and using learning media. At the same time, internet access facilities in the school support the development of digital learning media. The lack of variety of media educators use in teaching is not solely the fault of educators but does not optimize technological developments. So, researchers will develop interactive learning media and also raise digital pocketbooks.

Digital pocketbooks can improve students' critical and creative thinking skills by providing opportunities for students to interact with subject matter actively, independently, and collaboratively to stimulate students' critical and creative thinking. One of the efforts to improve student's critical and creative thinking skills can be enhanced through the use of more exciting learning media by research conducted by (Hendi, Caswita, and Haenilah, 2020) said that based on the results of the study, the critical thinking ability of students who use interactive learning media is higher than the critical thinking ability of students who do not use interactive learning media.

A student certainly needs books to support the material he teaches in the learning process. According to Utama (2018), textbooks today need to be innovated to keep up with the times and make learning more accessible for students. Learning media should be made to follow the times and technological advances. Technological advances are very rapid, especially in the field of education, so educators and students need to learn and utilize technology in the teaching and learning process; with the use of technology in education, students can master the material independently and can review lessons (Zetriuslita, Nofriyandi, & Istikomah, 2020).

The educational process in the rapidly developing 21st-century era, as it is today, makes it possible to optimize science learning through technology-based learning development such as Flipbook (Riyanto, Amin, Suwono, & Lestari, 2020). Flipbook is a media with an electronic format that can display interactive simulations by combining animation, text, video, images, audio, and navigation, making students more interactive, so learning is more exciting (Diani & Hartati, 2018).

The use of Flipbook in the learning process has a positive response; this can be seen based on previous research conducted by Pixyoriza et al. (2019), showing that the use of Flipbook media obtained a percentage of media results of 85% and obtained a rate of student response test results of 86%. Developing innovative teaching materials will help learners prepare new skills relevant to the 21st century (Asrizal, Amran, Ananda, Festiyed, & Sumarmin, 2018).

The development of digital pocketbooks has the potential to facilitate more natural interaction between students and subject matter because they have interactive features such as animations, images, videos, and other multimedia that can increase students' attractiveness to the subject matter.

Based on this background, through this final project, the author was motivated to conduct development research entitled "Development of a Flipbook-Based Digital Pocket Book on Environmental Pollution Material on the Critical and Creative Thinking Ability of Class VII Students at SMPN 1 Sojol Utara" The development of this learning media focuses on improving students' critical and creative thinking skills.

Research Methods

This study used two types of research: development research (Research and Development) and quasi-experiment research. Because it develops learning media, developing this digital pocketbook refers to the R&D model with 4D instructional design, which Thiagarajan put forward. The 4D design consists of four stages, namely: (1) Define (Observation, Material Analysis, and Learning Outcomes Analysis), (2) Design (Design of learning media products and design of research instruments), (3) Develop (Product validation by expert experts followed by revisions, limited trials, practicality tests), and (4) Disseminate (The use of products to assess the effectiveness of products that have been developed using tests of critical and creative thinking skills). As for research quasi-experiments, the design of pretests and postes is used to determine the condition of

students before and after being treated to distinguish the difference between experimental and control classes.

The results obtained from the research instrument will be analyzed to determine validity, practicality, and effectiveness. The data is analyzed quantitatively with descriptive statistics. The products developed will be tested for validity, practicality, and attractiveness using expert validation questionnaires, teacher practicality questionnaires, and student assessment questionnaires. As for the effectiveness test, it is carried out using test instruments and then analyzed using tests of critical thinking skills and creative thinking skills. Furthermore, at the quasi-experimental stage, an analysis was carried out using an effect size test to see the effectiveness of the learning media developed on students' critical and creative thinking skills.

Results and Discussion

1. Define

The activity carried out at this stage was conservation at SMPN 1 Sojol Utara school, where interviews were conducted with science subject teachers of SMPN 1 North Sojol Ibu Nur Idawati, S.Pd. This observation aims to obtain information from the school. The results of interviews obtained with science teachers conducted by researchers at SMPN 1 Sojol Utara showed that the obstacles experienced in science learning generally only refer to printed science books aimed at general use, which solely explain the material without being supported by interactive and exciting learning media, and only often use science printed books and PowerPoint media. So, science learning tends to be less attractive to student learning and decreases students' critical and creative thinking skills.

At this stage, material analysis is also carried out, which aims to analyze material that requires interactive and exciting learning media. This is related to the material that will be compiled in a flipbook-based digital pocketbook media; at this stage, the material chosen is environmental pollution.

Furthermore, learning outcomes are analyzed, which refers to the goals to be achieved in the learning process. It includes the knowledge, skills, attitudes, and competencies students must master upon completing a learning program. Analysis of learning outcomes at SMPN 1 Sojol Utara refers to the minimum completeness criteria of 70 and grade standards. This value is taken from the value of daily assignments, daily tests, and final exams, the results of which are then processed and adjusted to KKM; if they are still below the standard, remedial measures will be carried out.

2. Design

At this stage, the design of flipbook-based digital pocketbook media products, the preparation of research instruments, media selection, and media formats are carried out.

a. Flipbook-Based Digital Pocketbook Product Design

At the design stage, activities are carried out, namely compiling the initial design of a digital pocketbook based on data obtained at the defining stage. The first stage is to collect references for making digital pocketbooks in the form of materials that will be used to develop products, namely by collecting material from the results of reviewing

several journals related to environmental pollution materials. Furthermore, the stage of designing digital pocketbook content, at this stage, the digital pocketbook design consists of 3 parts, namely the beginning, end, and closing.

1) Initial Section

The beginning of the digital pocketbook consists of a cover and a thank you note addressed by the supervisor, examiner, and a team of media validation experts. Then, the preface, table of contents, and learning outcomes will consist of learning objectives. It also includes an initial description of environmental pollution material.



Figure 1. Initial View of Learning Media

2) Contents Section

The digital pocketbook consists of material about environmental pollution, namely water, soil, air, and sound pollution, and several video features related to the material. Each sub-material has examples of questions related to the material discussed.

3) Concluding Part

The closing part of the digital pocketbook consists of a summary of the material, glossary, bibliography, and author biography.

Figure 2.



Material Display & Examples of Learning Media Questions



Figure 3. Learning Media Closing Display

b. Instrument Preparation

The preparation of this instrument is based on indicators and learning objectives on environmental pollution material. The instrument is a critical thinking ability test composed of indicators providing simple explanations, building basic skills, inferring, providing advanced explanations, and organizing strategies and techniques. Creative

thinking ability test instruments are arranged based on fluency, flexibility, originality, and elaboration indicators.

c. Media and Format Selection

Media selection is based on the defining stage. The media chosen is media in digital form. In contrast, the selection of developed media formats results from previous research, which is used as learning media in conventional pocketbooks. Then, a learning media platform in the form of a flipbook-based digital pocketbook will be developed to improve students' critical and creative thinking skills.

3. Development

At the product development stage, the development of conventional pocketbook media to flipbook-based digital pocketbooks is designed first in the Canva application. This stage consists of several steps as follows:

a. Digital Pocket Book Design in Canva App

Digital pocketbook content design using the Canva application consists of several stages, namely:

1) Format Selection (A5 Format)

The digital pocket book format used is A5 size to the conventional pocket book format.

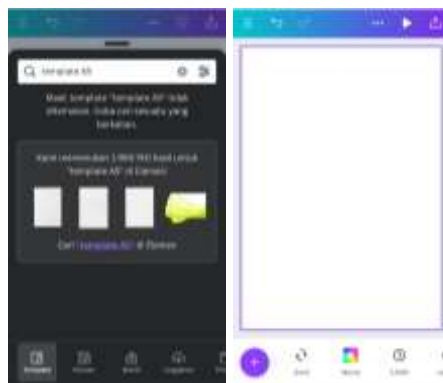


Figure 4. A5 Format Display

2) Template Selection

The digital pocketbook template was chosen according to the material's theme: environmental pollution.

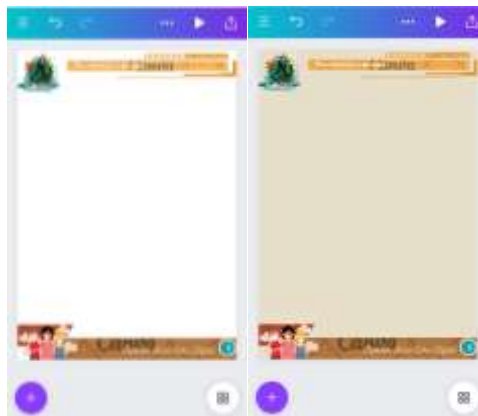


Figure 5. Template View

3) Element Selection

The design of the digital pocketbook uses elements available in the Canva application and some elements imported from images taken from the internet.

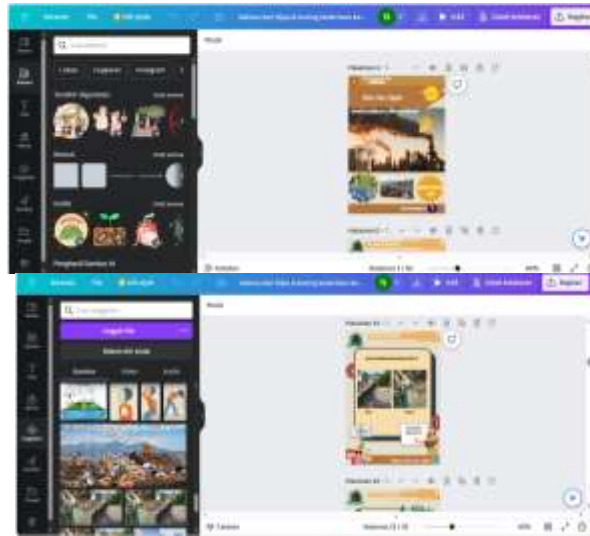


Figure 6. Element View

4) Learning Media Design (Environmental Pollution Material)

The design of the digital pocketbook is based on materials containing environmental pollution. The material that has been studied is first created in Microsoft Word and then copied to the digital pocketbook template available according to the instructions for presenting the material.



Figure 7. Display of Learning Media Materials

5) Artistic and Aesthetic

Adjust the colors, writing, and images on the digital pocketbook at this stage. The picture must be clear, the text must use easy-to-read letters, and the background color and text displayed must be adjusted.



Figure 8. Artistic and Aesthetic Display of Learning Media

6) Learning Media Navigation Design

Putting navigation on a digital pocketbook aims to make it easier for flipbook users to operate.



Figure 9. Learning Media Navigation Display

b. Learning Media Design on Heyzine Flipbook

After finishing the design in the Canva application then, the content is imported into the Heyzine Flipbook online application to be combined by adding video, links, and audio features that aim to make the content interactive and more enjoyable.



Figure 10. Learning Media Feature Display

After the design stage in Heyzine *Flipbook* is complete, the content will be shared via a link/barcode or email to test the resulting product.

c. Validation Test

At this stage, the validator provides an assessment, input, and suggestions for improving learning media devices and instruments that the researcher has compiled.

After that, the researcher makes improvements according to the input suggestions the validator gave so that the developed product can continue to the next testing stage.

1) Critical Thinking Ability Test Validation

The critical thinking ability test was validated by two validator lecturers who aimed to measure the validity/feasibility of the student's critical thinking ability test instruments. Data on the assessment of students' critical thinking skills can be seen in Table 1.

Table 1
Critical Thinking Skills Test Validation Results

Instruments	Validation Results (%)		Number of Validators
	Validator 1	Validator 2	
About Critical Thinking Skills	100	78,12	178,12
	Overall Average of Validation		89,06%
	Category		Highly Valid

Based on Table 1, the validation results of critical thinking skills tests in science learning obtained a percentage of 89.06%, which can be categorized as very valid.

2) Creative Thinking Ability Test Validation

The creative thinking ability test was validated by two validator lecturers who aimed to measure the validity/feasibility of the student's creative thinking ability test instruments. Data on the assessment of students' creative thinking skills can be seen in Table 2.

Table 2
Creative Thinking Ability Test Validation Results

Instruments	Validation Results (%)		Number of Validators
	Validator 1	Validator 2	
About the Ability to Think Creatively	96,87	78,12	174,99
	Overall Average of Validation		87,49
	Category		Highly Valid

Based on Table 2, the validation results of the creative thinking ability test in science learning obtained a percentage of 87.49%, which can be categorized as very valid.

3) Flipbook-Based Digital Pocketbook Validation

The average validator assessment results of flipbook-based digital pocketbooks can be seen in Table 3.

Table 3
Validation Results of Digital Pocket Book-Based

Instruments	Validators	Validation Results (%)		Percentage (%)	Category
		Validator 1	Validator 2		
Flipbook-Based Digital Pocketbook	Content Expert	92,72	85,45	89,08	Highly Valid
	Development Expert	91,66	78,33	85	Highly Valid

on Environmental Pollution Material	Design Expert	91,81	81,81	86,81	Highly Valid
Overall Average of Validation				86,96%	Highly Valid

Based on Table 4.3, the average result of flipbook-based digital pocketbook validation by experts is 86.96%, with a very valid category. According to experts, based on the data from product validation, flipbook-based digital pocketbooks are very valid, so they can be used and continued to the next testing stage.

4) Limited Trial

A limited trial was conducted by asking for an assessment of flipbook-based digital pocketbook products to grade VII c students at SMPN 1 Sojol Utara. The results of the flipbook-based digital pocketbook limited Cobb test can be seen in Table 4.4 below:

Table 4
Flipbook-based digital pocketbook limited trial assessment results by students

Valuation	Percentage (%)	Category
Student	86,4%	Very interesting

Based on Table 4, a limited trial of flipbook-based digital pocketbooks in science learning at SMPN 1 Sojol Utara obtained percentage results of 86.4%. They were categorized as very interesting when used in science learning.

5) Practicality Test

An assessment of the practicality of flipbook-based digital pocketbooks is given to teachers in the field of science studies, which aims to determine the level of ease of content of teaching materials and the suitability of digital pocketbooks in learning science and environmental pollution materials. Data on the results of practical assessment by science teachers can be seen in Table 5.

Table 5
Results of Teacher Assessment of the Practicality of Flipbook-Based Digital Pocketbooks

Valuation	Percentage (%)	Category
Teacher	80%	Valid

Based on Table 5, the practical results of flipbook-based digital pocketbooks in science learning at SMPN 1 Sojol Utara obtained percentage results of 80%. They can be categorized as practical in science learning.

4. Dissemination

At this stage, dissemination was carried out in two phases: testing the effectiveness of flipbook-based digital pocketbooks on students' critical thinking and creative thinking skills in learning science environmental pollution materials.

a. Critical Thinking Ability Test Results of SMPN 1 Sojol Utara Students

Data on students' critical thinking skills were obtained from the test results of grade VII A and VII B students. As many as six questions were given to students to determine the improvement of students' critical thinking skills before and after implementing

flipbook-based digital pocketbooks. The analysis results of students' critical thinking skills can be seen in Table 6.

Table 6
Results of Analysis of Critical Thinking Skills of SMPN 1 Sojol Utara Students

Respondents	Average Critical Thinking Ability Score	Category
Class VII A Students	70,83	Critical
Class VII B Students	56,87	Quite Critical

Table 6 above shows the value of students' critical thinking skills. Class VII A obtained an average score of 70.83 in the ability to think critically. At the same time, class VII B obtained an average score of 56.87, which is insufficient critical thinking.

b. Results of Creative Thinking Ability Test of SMPN 1 Sojol Utara Students

Data on students' creative thinking skills were obtained from the test results of grade VII A and VII B students. As many as four questions were given to students to determine the improvement of students' creative thinking skills before and after implementing flipbook-based digital pocketbooks. The analysis results of students' creative thinking skills can be seen in Table 7.

Table 7
Results of Analysis of Creative Thinking Ability of SMPN 1 Sojol Utara Students

Respondents	Average value of creative thinking ability	Category
Class VII A Students	84,37	Creative
Class VII B Students	69,04	Quite Creative

Table 7 above shows the value of students' creative thinking ability. Class VII A obtained an average score of 84.37 in the ability to think creatively. Class VII B obtained an average score of 69.04 in the category of creative thinking.

c. Effect Size Test

The effect size test was conducted to see the effectiveness of flipbook-based digital pocketbooks on the critical and creative thinking skills of SMPN 1 Sojol Utara students. The results of the effect size test analysis can be seen in Table 8 and Table 9.

Table 8
Results of *Effect Size Test* on Critical Thinking Ability of SMPN 1 Sojol Utara Students

Name	Average	Standard Deviation	Effect Size Value	Interpretation
Pre-Test Experimental Class (VII A)	45,624	14,876	1.95	Very Large
Post-Test Experimental Class (VII A)	70,833	10,622		
Control Class Pre-Test (VII B)	45,416	15,750	0,73	Keep
Post-Test Control Class (VII B)	56,875	15,549		

Table 8 is the result of the effect size test for critical thinking skills in class VII A, which obtained an average pretest value of 45.624 with a standard deviation of 14.876 posts of 70.833. A standard deviation value of 10.622 with an effect size value of 1.95 huge categories. In contrast, class VII B obtained an average pretest value of 14.876, postes of 70.833, and a standard deviation value of 10.622 with an effect size of 1.95 in the vast category. In contrast, class VII B obtained an average pretest value of 45.416 and a standard deviation of 15.750, while the average value of postes is 56.875. The standard deviation value is 15.549, and the effect size value of class VII B is 0.73, which can be categorized as medium.

Table 9
Results of the Effect Size *Test of Creative Thinking Ability of Students of SMPN 1 Sojol Utara*

Name	Average	Standard Deviation	Effect Size Value	Interpretation
Pre-Test Experimental Class (VII A)	59,062	15,621	1.95	Very Large
Post-Test Experimental Class (VII A)	84,375	9,582		
Control Class Pre-Test (VII B)	59,062	18,799	0.57	Keep
Post-Test Control Class (VII B)	69,062	15,746		

Table 9 is the result of the effect size test for the problem of creative thinking ability in class VII A, which obtained an average pretest value of 59.062 with a standard deviation value of 15.621 and postes of 84.375 and a standard deviation value of 9.582 with an effect size value of 1.95 in the vast category. In contrast, class VII B obtained an average pretest value of 59.062 and a standard deviation of 18.799, while the average value of posts was 69.062 and 15.746. The effect size value of class VII B was 0.57, which can be categorized as medium.

Validity of Learning Media

Flipbook-based digital pocketbooks and research instruments are tested for validity before being implemented to produce valid products and instruments in science learning. Validation/due diligence determines whether or not a product is valid with specific criteria.

Research instruments consisting of test instruments for students' critical and creative thinking skills are also tested for validity and categorized as valid and suitable. The validation of the critical thinking ability test instrument obtained an average percentage score of 89.06%, and the validation of the student creative thinking ability test instrument obtained an average percentage score of 87.49%. Burhanudin et al. (2023) explained that the level of product validity is determined by the results of expert assessments that provide assessments in the form of suggestions and inputs as a follow-up to product improvements that aim to add elements of product differentiation before the product is used.

Flipbook-based digital pocketbooks on environmental pollution materials are considered valid and suitable for science learning. This is based on the validation analysis results that several experts assessed. Flipbook-based digital pocketbook analysis showed an average percentage result of 86.96%. The validator lecturer also provided advice related to flipbook-based digital pocketbooks on environmental pollution material, such as revision material in the form of text color suitability, text size, and completeness of material on the media.

Limited Trial

Limited trials of flipbook-based digital pocketbooks were carried out product trial assessments given to grade VII C students as many as ten people, namely representatives of low, medium, and high-level abilities, which aimed to measure student responses to the products developed. The implementation of the limited trial consists of three stages, namely (1) introducing flipbook-based digital pocketbook media, (2) conducting flipbook-based digital pocketbook trials, and (3) filling out the limited trial questionnaire that has been distributed. Based on the limited test analysis results, flipbook-based digital pocketbooks in science learning at SMPN 1 Sojol Utara obtained percentage results of 86.4% and were categorized as very interesting if used in science learning. This is in line with the research of Satriani et al. (2023), in their study on the development of android-based economic learning media with a modular platform on introductory material to economics for grade X students at SMAN 1 Balung Jember Regency, stated that the developed economic learning media is attractive with a limited percentage of trials is 89.85% with exciting criteria.

The practicality of Learning Media

The flipbook-based digital pocketbook media practical test results to improve student's critical and creative thinking skills in science learning at SMPN 1 Sojol Utara were declared practical with percentage results of 80% and categorized as practical. This shows that the flipbook-based digital pocketbook developed is suitable for science learning. Halifah and Suasti., (2023), in their research on the development of digital pocketbooks using the Canva application and *flipbooks* on the basic concepts of geography, stated that digital pocketbooks have met the feasibility of the practicality of these teaching materials. (Bria, Rahayu, and Sumartiningsih, 2024) explained that the existence of teaching materials can influence many things. For students, the presence of teaching materials helps them be more proactive in the learning process, more easily understand learning materials, and students enjoy learning more.

The Effectiveness of Learning Media

Effectiveness tests are conducted to determine the effectiveness of the developed media to improve students' critical and creative thinking skills. This effectiveness test is carried out after all meetings have been completed. The effectiveness test is seen from the pre-test and post-test results and the effect size of Cohen, where the average pre-test score of class VII A for critical thinking skills obtained by students is 45,624. The average post-test score obtained by students is 70,833, while class VII B obtains an average pre-

test score of 45,416 and an average post-test score of 56,875; this shows the value of creative thinking ability of class VII A is higher than class VII B.

The effectiveness test of students' creative thinking skills for class VII A obtained an average pre-test score of 59.062 and an average post-test score of 84.375, and for class VII B obtained an average pre-test score of 59.062 and a post-test score of 69.062, this shows the value of creative thinking ability of grade VII A students is higher than class X B.

The results of the test of students' critical and creative thinking skills from the two classes showed differences due to the use of different learning media, where class VII B used science printed books while VII A used flipbook-based digital notebooks that were developed so it can be concluded that the better the learning media used, the better the results will be obtained.

The results of the critical thinking skills test from the two classes show differences due to the use of different learning media, whereas class VII B uses printed science books. In contrast, VII A uses flipbook-based digital pocketbooks, so it can be concluded that the better the learning media used, the better the results will be obtained.

In line with (Andari, 2020) research on the use of Kahoot educational game-based learning in physics learning, the more significant the increase in student learning outcomes, the higher the score of using game media, the higher the student learning outcome score. It can be interpreted that the use of exciting learning media, namely game media, motivates students more, and it will also be better if it affects their learning outcomes.

The average value of effect size Cohen obtained for critical thinking skills of class VII A is 1.95 with extensive criteria, while class VII B obtained an effect size value of 0.73 with medium criteria; this shows that flipbook-based digital pocketbooks are effectively used on environmental pollution materials to improve the critical thinking skills of grade VII students at SMPN 1 Sojol Utara. The effect size value of the creative thinking ability of grade VII A student is 1.95, tremendous, while the effect size value of class VII B is 0.57 with medium criteria; this shows that flipbook-based digital pocketbooks are effectively used on environmental pollution materials to improve the creative thinking ability of class VII at SMPN 1 Sojol Utara, which can be concluded that H_a was accepted and H_o was rejected.

The results of this study support empirical evidence from previous research (Silaban & Manalu, 2024), the title of the electronic book development research using the flipbook maker application on energy-matter in living systems at SMP 6 Jember, based on the results of product analysis shows that data on material and media validity test results obtained very valid criteria with a percentage of material validators 85.74% and media validators 88.04%, and product testing, the response test of small group students obtained exciting criteria with a percentage score of 90.44%, based on the tests carried out, the results of the products developed in the form of integrated science e-book teaching materials based on flipbook makers, energy materials in living systems for grade VII junior high school students can be used in learning.

Conclusion

Based on the results of research that has been conducted at SMPN 1 Sojol Utara, it can be concluded as follows:

The Flipbook-Based Digital Pocket Book developed is classified as valid, with a score of 86.96%, in the very valid category. Moreover, improved the critical thinking skills of SMPN 1 Sojol Utara students, who scored 70.83% in the critical thinking category.

The Flipbook-Based Digital Pocket Book developed is classified as valid, scoring 86.96% in the very valid category. Moreover, improved the creative thinking ability of SMPN 1 Sojol Utara students, who scored 84.37% in the creative thinking category.

Flipbook-based digital pocketbooks are effective for students' critical thinking skills. As evidenced by the results of the effect size test in the experimental class, a value of 1.95 was obtained in the vast category. In contrast, the control class obtained a value of 0.73 in the medium category. It can be said that the effect size value of the experimental class is in the vast category, which means that flipbook-based digital pocketbooks on environmental pollution material are adequate for the critical thinking skills of SMPN 1 Sojol Utara students.

Flipbook-based digital pocketbooks are effective for students' creative thinking skills. As evidenced by the results of the effect size test in the experimental class, a value of 1.95 was obtained in the vast category. In contrast, the control class obtained a value of 0.57 in the medium category. It can be said that the effect size value of the experimental class is in the vast category, which means that flipbook-based digital pocketbooks on environmental pollution material are adequate for the creative thinking ability of SMPN 1 Sojol Utara students.

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