DEVELOPMENT OF WEB-BASED FLIPBOOKS ON ANIMAL ADAPTATION TO THEIR ENVIRONMENT FOR GRADE VI ELEMENTARY SCHOOL

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ABSTRACT

This research is a research and development using the ADDIE model (analysis, design, development, implementation, and evaluation). The data in this study consist of qualitative data and quantitative data. Qualitative data in the form of suggestions and comments from validators, teacher responses and student responses regarding the products developed. While quantitative data in the form of the results of the validation questionnaires of media experts, materials, language, teacher response questionnaires and student response questionnaires. The subjects of this study were grade VI students of SDN 2 Narimbang Mulia. The data of this study were obtained through validation questionnaires of media experts, material experts, language experts, teacher response questionnaires, student response questionnaires, interviews and documentation. Then the data was analyzed to determine the level of validity and effectiveness of the product. The results of research and development based on the media validation questionnaire fall into the "very valid" criteria, the results of the material validation fall into the "very valid" criteria, and the results of the language validation fall into the "very valid" criteria. The assessment of the effectiveness of flipbook teaching materials based on the teacher response questionnaire falls into the "very effective" criteria, the student response questionnaire falls into the "very effective" criteria and the results of the flipbook usage test fall into the "very effective" criteria.

ABSTRAK

Penelitian ini merupakan penelitian dan pengembangan atau (*Research and Development*) dengan menggunakan model ADDIE (analysis, design, development, implementation, dan evaluation). Adapun data pada penelitian ini terdiri dari data kualitatif dan data kuantitatif. Data kualitatif berupa saran dan komentar dari validator, respon guru dan respon peserta didik mengenai produk yang dikembangkan. Sedangkan data kuantitatif berupa hasil perolehan angket validasi ahli media, materi, bahasa, angket respon guru dan angket respon peserta didik. Subyek penelitian ini adalah peserta didik kelas VI SDN 2 Narimbang Mulia. Data penelitian ini diperoleh melalui angket validasi ahli media, ahli materi, ahli bahasa, angket respon guru, angket respon peserta didik, wawancara dan dokumentasi. Kemudian data dianalisis untuk mengetahui tingkat validitas dan keefektivitasan produk. Hasil penelitian dan pengembangan berdasarkan angket validasi media masuk dalam kriteria "sangat valid", hasil validasi materi masuk dalam kriteria "sangat valid", dan hasil validasi bahasa masuk dalam kriteria "sangat valid". Penilaian efektivitas bahan ajar flipbook berdasarkan angket respon guru masuk dalam kriteria "sangat efektif", angket respon peserta didik masuk dalam kriteria "sangat efektif" dan hasil tes penggunaan flipbook masuk dalam kriteria "sangat efektif".
Kata Kunci: bahan ajar, flipbook, ADDIE

INTRODUCTION

Human civilization has now entered a new era, namely the Industrial Revolution 4.0 era. The Industrial Revolution 4.0 is marked by the presence of very rapid technological developments (Rini, Ratnawati, and Wulandari 2021). Current technological developments in the era of revolution 4.0 increasingly facilitate the distribution of unlimited information. Technology in the era of revolution 4.0 has penetrated all areas including the education sector which of course has a positive impact on all aspects (Chen, Chen, and Lin 2020). For example, currently there are many online platforms that provide facilities for students' needs. The role of teachers in schools is only as a facilitator because students are required to be independent in seeking information that does not only come from teachers and reading texts in books (Salfina et al. 2021). Learning in the current technological era has changed the learning paradigm that students have a fairly central role in learning activities (Magfirah, Hidayat, and Mahanal 2019). Digital technology itself can create appropriate learning media for students. Therefore, teachers must know how to use and develop digital technology to make it a meaningful learning medium (Metasari and Amalia 2024). As time progresses, the curriculum in education also develops and not only the development of the curriculum, but the implementation of learning activities has also shifted to modern learning, and the use of technology is increasingly rapid, to meet the demands of education (Zhao 2019). The use of technology in education is an adaptation to the dynamic developments of the times (Rulyansah et al. 2022). As educators, there needs to be awareness in developing teaching materials for the future (Teknowijoyo 2022). Teachers must be able to involve students in learning activities and develop teaching materials that can attract students to learning activities, as well as make learning activities easier (Sharma, Kawachi, and Bozkurt 2019). The use of teaching materials in schools influences students' interest in learning and learning motivation in participating in learning (Zahara, Azkia, and Chusni 2023). In addition, teaching materials also have a fairly important role in designing student-centered learning (Simbolon et al. 2022). Student-centered learning is a solution to the challenges that students need to face in responding to the challenges of 21st century learning today (Trinaldi et al. 2022). Another function that is no less

important than teaching materials is that they can also foster students' critical thinking skills (Ziliwu and Anas 2024).

Based on the results of the pre-research that the researcher has carried out through interviews conducted with the homeroom teacher of class VI SDN 2 Narimbang Mulia in Lebak Regency, Banten Province in the 2023/2024 academic year, information was obtained that learning activities still use conventional methods, in which students still listen to the teacher's explanation and student participation in learning is lacking. The teaching materials used in learning activities are often limited to the use of reading texts in books, even though there are pictures in the textbooks, causing a lack of student interest in participating in learning, which results in low student understanding of the learning material. The use of effective teaching materials will certainly improve students' understanding and motivation to learn (Fatimah et al. 2022). In addition, students lack experience in learning using technology that they can use independently, and web-based flipbook teaching materials have not been utilized properly by teachers and students, so that SDN 2 Narimbang Mulia has not implemented flipbook-based digital teaching materials. Then the use of technology used in learning activities is still lacking, as evidenced by the rare use of projectors and smartphones in learning activities. By utilizing technology in learning, it will certainly make learning more meaningful and provide new experiences for students, which will foster students' interest in learning (Moturu and Nethi 2023). Currently, most students already have smartphones, but students still have minimal experience learning using technology. For this reason, researchers want to develop digital teaching materials, namely web-based flipbooks (Kurino 2022).

The teaching materials used are expected to facilitate and be able to contain the material to be studied by students. The teaching materials referred to in this study are digital teaching materials, digital teaching materials are sources of information that can be displayed with various digital devices via the internet network, using digital technology such as smartphones, laptops and other digital technologies (Roll and Wylie 2016). The use of digital teaching materials can provide students and teachers with experience and insight regarding technology-based learning (Sinta, Rahayu, and Purnawarman 2019). The technology allows teachers to create polls, send them to students, collect their responses and reveal the results in real time (Clark-Wilson, Robutti, and Thomas 2020). Learning based on teaching materials can increase the creativity of participants and the interests and learning outcomes of students. Creating digital teaching materials requires a need in order to achieve curriculum goals (Utami and Atmojo 2021). Analysis of teaching material needs is the main step to find out the development of digital teaching materials (Nieto-Márquez, Baldominos, and Pérez-Nieto 2020). Digital teaching materials which can be used in classrooms are also important technological supports (Demirkan 2019). In terms of the use of technology implemented in learning, digital teaching materials have several advantages compared to conventional teaching materials (Ismawati and Ramadhanti 2022). The advantage of digital teaching materials is that the learning paradigm will be student-centered and the teacher will only act as a learning facilitator, then learning will become more independent for students (Alimuddin et al. 2023). However, even though digital teaching materials allow students to learn more independently, it remains true that the role of teachers cannot be replaced by technology, teachers have a key role in the success of learning (Tjahyanti, Saputra, and Gitakarma 2022). Even though digital teaching materials seem to be related to technology, in fact digital teaching

materials will be effective to use if teachers develop the digital teaching materials by carefully paying attention to each competency that must be achieved by students, in the sense that teachers still have an important role in developing digital teaching materials without being replaced by the role of technology.

One of the digital teaching materials that can be given to students is a flipbook. A flipbook is a digital book that can be accessed from the internet using many devices (Salzabila and Fathurrahman 2024). Flipbooks are electronic books that can display interactive simulations using text, images, audio, video, animation, and navigation (Wuryandani 2024). Flipbooks are also an innovation of conventional textbooks that are interactive with a series of features and navigation that vary gradually from one page to the next (Mutiara and Emilia 2022). Flipbooks are a form of digital book presentation and their use is interactive. The use of flipbooks can also provide more interesting learning activities, because they contain sound, animation, video and interactive question components, and provide a broad and enjoyable impression. Flipbooks can be used as digital teaching materials for students individually or in groups, and flipbooks are practical and flexible and can increase students' motivation and interest in learning because they can visualize 3-dimensional images into lesson concepts (Hardiansyah and Mulyadi 2022).

This research has an urgency, namely the potential to increase insight for educators with the tools and resources needed to create interesting and effective digital teaching materials, ensuring that learning activities remain relevant and meaningful in the digital era. Its main strength lies in the focus of two-way interaction in learning. Not only as a teaching material for teachers in teaching, this flipbook teaching material also has a role in helping students learn independently so that learning is more meaningful.

METHODS

Type and Design

This type of research is research and development or commonly called Research and Development (R&D). The research and development method is used for researchers who aim to design new products, test existing products, test products resulting from development, and test products resulting from creation (Sugiyono 2019). The development model used in this research and development is the ADDIE model. The ADDIE development model has five development stages including the stages (1) Analyze, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation (Putra, Sidiq, and Mahlianurrahman 2023).

1. Analyze

   The first stage of developing digital flipbook teaching materials is to analyze student needs and competencies in order to find out information about the teaching materials used during learning in order to obtain an overview of the teaching materials that will be developed to improve the quality of learning.

2. Design

   The design stage aims to design the teaching material product that will be developed. Things that need to be considered in making this teaching material product include making a storyboard, determining basic competencies and competency achievement indicators, determining learning objectives, compiling materials, and designing the layout of flipbook teaching materials as well as designing student worksheets and evaluation tests.

3. Development

    The next stage is the development stage, in this stage the flipbook teaching materials that have been designed require validation from experts (media, material and language experts) to test the feasibility of the developed teaching materials. then the flipbook teaching materials that have been validated by experts are tested in small groups.

4. Implementation

    The implementation stage is to conduct a trial of the flipbook teaching material product by involving students and teachers in learning activities in order to determine the effectiveness of the teaching materials developed through the distribution of questionnaires related to student responses and teacher responses to the use of flipbook teaching materials during learning activities.

5. Evaluation

    At this stage, it is an activity to assess whether each step of the product activity that has been made is in accordance with the specifications or not by making final revisions to the product that was developed based on suggestions and input from students and teachers given during the implementation stage, and the results will be obtained in the form of a score of the effectiveness of the teaching materials. The results of the scores obtained will then be analyzed to determine the level of validity and effectiveness of the flipbook teaching material product that has been developed.

Data and Data Sources

This study developed digital teaching materials using a flipbook platform to teach animal adaptation to its environment to grade VI elementary school students. This study was conducted in grade VI of SDN 2 Narimbang Mulia located in Rangkasbitung District, Banten Province with 17 students. Various data collection tools used in this study were interviews, expert validation sheets, and student response questionnaires to measure the level of practicality of the teaching materials.

1. Interviews were conducted with grade VI teachers to obtain data that explores deeper information about students' learning needs and competencies in the form of curriculum used in schools.

2. Trials were used to obtain data on the effectiveness of web-based flipbook teaching materials by providing 20 questions that had been prepared by researchers that had been adjusted to the basic competencies set and adjusted to varying levels of cognitive levels.

3. The questionnaire used by the researcher was a closed questionnaire, then the validation questionnaire instrument was given to media experts, material and language experts, and an effectiveness questionnaire for use to teachers and students to obtain responses to the use of flipbook teaching materials. In each questionnaire instrument, it is classified according to the indicators of expert validation needs as well as teacher and student responses which are poured into 10 questions in each questionnaire.

Data collection technique

Data collection uses procedures that refer to the systematic approach used by researchers to collect data needed to answer research problems (Riduan, Suryani, and Patricia 2024). The use of questionnaires, interviews and documentation are data collection methods used in this study. Questionnaire as an instrument that contains questions and is designed based on a

measuring tool for variables in research (Holmes 2023). This research questionnaire was used for expert validation and conducting product trials on teachers and students in the school environment. The researcher used a Likert scale in his research. An interview is a structured interaction between two individuals that aims to exchange information and ideas by asking questions and providing answers. Interviews were conducted to seek information related to the analysis of research data needs (Riduwan 2017). Interviews were conducted with grade VI Elementary School teachers. The information needed was in the form of problems that occurred in science and natural science learning, student characteristics, materials and curriculum used in learning. Then the questionnaire was in the form of student responses related to the use of flipbook teaching materials in learning.

Data analysis

Data analysis in this study used analysis of qualitative and quantitative data. Qualitative data was obtained in the form of input and suggestions by media expert validators, material experts and language experts. In addition, qualitative data also consisted of the results of interviews conducted with elementary school grade VI homeroom teachers. Meanwhile, quantitative data was obtained from questionnaire and test scores. The formula used to analyze data from questionnaire sheets and test results used a Likert scale (Suryanto 2014),

$$P = \frac{f}{n} \times 100\%$$

Information :

P = score percentase

f = total score of data collection results

n = maximum score

After obtaining the results using the formula above, you will get the following percentage assessment score results (Riduan et al. 2024).

Tabel 1. Expert Assessment Score Percentage Criteria

Evaluation	Interpretation Criteria
81% < × < 100%	Very Valid
61% < × ≤ 80%	Valid
41% < × ≤ 60%	Enough
21% < × ≤ 40%	Invalid
0% < × ≤ 20%	Very Invalid

The validation sheets from media experts, teaching material experts and language experts were then calculated and analyzed to obtain validity criteria. Based on table 1 above, the results of the validation percentage from each expert were then converted into 5 criteria, the criteria starting from the lowest, which is very invalid, to the highest criterion, which is very valid.

Then in the student and teacher response questionnaire in this study, a Likert scale was used to determine the effectiveness of web-based flipbook teaching materials using a Likert scale of 1-5 with answer scores of strongly agree (5), agree (4), undecided (3), disagree (2), and strongly disagree (1).

Tabel 2. Percentage Criteria for Student and teacher Response Scores

Evaluation	Interpretation Criteria

81% < × < 100%	Very Effective
61% < × ≤ 80%	Effective
41% < × ≤ 60%	Enough
21% < × ≤ 40%	Ineffective
0% < × ≤ 20%	Very Ineffective

The data obtained from the student and teacher response questionnaire were then processed and analyzed based on student answers according to table 2, the criteria start from the lowest, which is very ineffective, to the highest criteria, which is very effective.

RESULTS AND DISCUSSION

This research and development uses the ADDIE development model, this model has 5 stages consisting of: analysis stage, design stage, development stage, implementation stage and evaluation stage.

Analyze

Researchers conducted an analysis of student needs and competency analysis. Analysis of student needs in learning activities, namely the need for innovation in teaching materials used in learning activities that can help students to learn independently that can be used anytime and anywhere that is adjusted to the level of student ability (low, medium and high) and accompanied by various learning styles (visual, auditory and kinesthetic). Then a competency analysis was carried out to determine the use of the curriculum currently used in schools in the 2023-2024 academic year, this was done as a basis for adjusting the development of teaching materials. The teaching materials developed by researchers in learning activities use science content on animal adaptation to their environment using web-based flipbook teaching materials.

Design

At the design stage, the researcher designed a teaching material product to be developed, namely a digital flipbook book for science learning in grade VI A of elementary school. The format of the digital flipbook book refers to the curriculum in force at the school with several components including: front cover, table of contents, list of teaching material menus, instructions for use, material identity, learning materials covering learning styles (visual, auditory and kinesthetic) through activities let's read, let's watch, let's sing, let's discuss, let's practice and let's reflect, activities to evaluate learning materials and students' abilities and understanding are carried out through discussions by filling in mind map tables and practice questions in the form of interactive quizzes, bibliographies and glossaries, author profiles and back covers. The digital flipbook book has an initial form in the form of a storyboard which is used as a reference in making a product prototype, the following web-based flipbook teaching material products can be seen in the picture below, as follows:

Figure 1. View of the web-based flipbook teaching material

The picture is a cover of the flipbook teaching material display that has been developed. The image contains the name of the subject, the title of the learning material, and the class level indicating that it is for grade VI of elementary school.
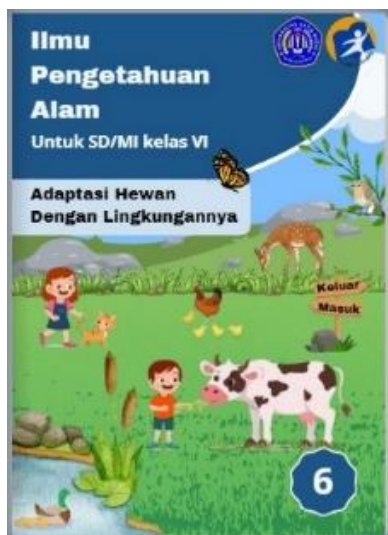
After the researcher designed the appearance of the flipbook teaching material, the next step was to design the content or material of the flipbook teaching material. The researcher designed the content of the material by referring to the upper grade elementary school science textbook and sixth grade science textbook on the topic of animal adaptation to its environment.
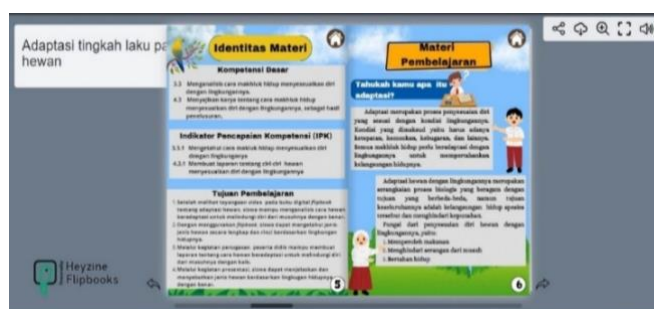

Figure 2. Views of learning materials

The image contains information related to the identity of teaching materials such as basic competencies, learning indicators, learning objectives and learning materials.

Development

The development stage is carried out after the product design is complete, then the flipbook that is developed undergoes validation testing from experts (media experts, material experts and language experts). The results of the media expert validation obtained a score of 46 with an average percentage of 92% with the criteria of "very valid". The results of the material validation obtained a score of 46 with an average percentage of 92% with the criteria of "very valid", the conclusion given by the material expert validation is that it is suitable for use. The results of the language expert validation obtained a score of 48 with an average percentage of 96% with the criteria of "very valid". The conclusion given by the language expert validation is that it is suitable for use for research.
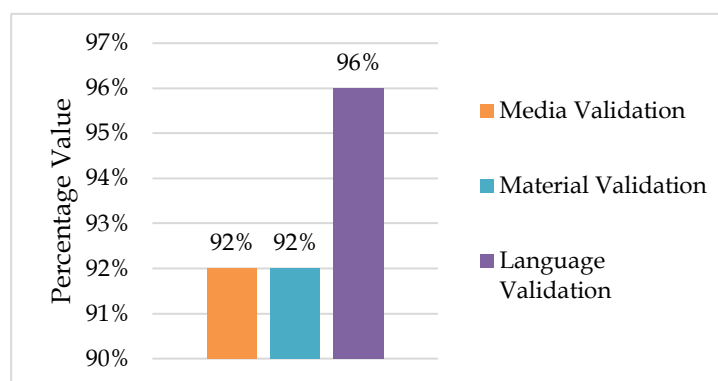
Figure 3. Validation of Flipbooks Teaching Materials from experts

The percentage result of the feasibility level by media experts got a score of 46 with a percentage of 92% entering the very feasible criteria. The assessment of the feasibility of the content by material experts got a score of 46 with a percentage of 92% entering the very feasible criteria. The assessment of the feasibility of language use by language experts got a score of 48 with a percentage of 96% with the very feasible criteria. All three are included in the valid and easible criteria.

Implementation

The implementation stage is carried out by means of a large group trial on the product developed in real conditions to determine the level of effectiveness of the digital flipbook book. The large group trial was carried out by involving 17 students of class VI A of SD Negeri 2 Narimbang Mulia and the homeroom teacher of class VI A. This stage aims to ensure the use of digital flipbook books is effective in learning activities.
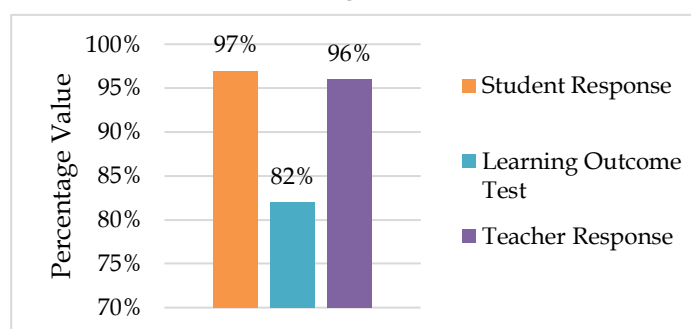

Figure 4. Effectiveness of Flipbooks Teaching Materials

The percentage results of the level of effectiveness by students through the student response questionnaire sheet got a score of 831 with a percentage of 97.7% entering the very effective criteria. Then the test results got a score of 1,398 with a percentage of 82.2% entering the very effective criteria. The teacher response questionnaire assessment got a score of 48 with a percentage of 96% entering the very effective criteria.

Evaluation

The evaluation stage is carried out to assess whether each step of the activity of the developed product is in accordance with the specifications or not by making final improvements to the developed product based on suggestions and input from media experts,

material experts, language experts, teachers and students. The evaluation is carried out by paying attention to the appearance of the digital flipbook book, both in terms of color selection, images, learning materials, learning videos, and practice questions used, in order to become a quality product.

CONCLUSION

Based on the results of research and development that have been conducted by researchers, it can be concluded that web-based flipbook teaching materials that have been developed are based on a feasibility assessment by media experts, a content feasibility assessment by material experts and a feasibility assessment of language use by language experts. The level of validity of the media, material and language are all included in the "very valid" criteria. The effectiveness of web-based flipbook teaching materials is included in the "very effective" criteria for use in science learning on animal adaptation to their environment.

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