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Validity and Practicality: Development of an Interactive Flipbook to Enhance Students Knowledge and Digital Literacy

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ABSTRACT

The 21st century increases competitiveness by requiring students to have various skills. Technology and learning media are very important to support the learning process. However, without new innovations in the use of this learning media, students will not achieve learning goals and master the skills needed. The purpose of this study is to design and develop interactive learning media in the form of flipbooks to improve students understanding and digital literacy on the classification of living things, Plantae sub-material, Angiosperm sub-division, especially about the types of medicinal plants used by the Betawi Ciracas people. It also aims to provide new knowledge with interactive digital learning media, so that it can be used while learning. The results of this research are in the form of an interactive flipbook named "Intobamaskutaras" (Intervarisasi tanaman obat masyarakat suku Betawi Ciracas). The methodology of this research is research and development using the ADDIE model, among others; Analyze, design, develop, implement, and evaluate. Data collection techniques are in the form of observations, interviews and questionnaires. The subjects in this study involved 10 students as the initial trial subject, and 36 students as the subject of the use trial. Based on the results of the validation of material experts, 90.83%, and media experts, of 91.36%, are included in the very good or very valid category. In terms of usability, it obtained an assessment percentage of 97.75% from the results of the response of teachers and students to the practicality of flipbooks. This shows that the beneficial aspect of this flipbook is very practical.

Keywords: *ethnobotany, flipbook, medicinal plants, research and development.*

INTRODUCTION

The study of the relationship between plants and humans, including the use of plants in everyday life is called ethnoboreton. Ethnobotany also includes the study of peoples knowledge of plants in a particular field, such as the way people use plants to make traditional medicine (Dewantari et al., 2018). Ethnobotany is a field of science that studies the relationships between humans (of a particular ethnic or social group) and how they interact with plants. The interaction in each place is different and is greatly influenced by the quality and possible diversity of plants there (Tima et al., 2020).

Meanwhile, in urban areas, the use of medicinal herbs began to decline in popularity. Since, synthetic drugs are considered to be more successful in curing diseases and have undergone clinical testing, their use has accelerated the adoption of these medicinal plants. As a result, various diseases are treated with medicinal herbs. Therefore, to avoid this, the younger generation needs to learn more about therapeutic herbs. Thus, traditional medicine can be passed on to the next generation (Apriyanti & Alang, 2023). It is very important for learners, especially teenagers from an early age,

to get to know medicinal plants, so that their curiosity increases and they begin to learn to make decisions, and knowledge of medicinal plants can help them gain more information (Zulyetti, 2019).

Based on direct observations, at the junior high school level, this directly affects the direction and content of the curriculum. Environment-based education refers to the incorporation of environmental knowledge, concepts, and values into formal and informal education. This education aims to teach students how to manage natural resources responsibly, foster a sense of sustainability, and improve their understanding of human and environmental interdependence. One way to encourage students to be more environmentally conscious is to teach them to identify medicinal plants. Its main goal is to equip learners with the knowledge and skills they need to address environmental issues and contribute to the development of sustainable solutions.

In addition to the four essential skills needed to live in the 21st century, learners must have communication skills, critical thinking skills, creativity skills, and collaboration. In this regard, digital literacy is one of the abilities to understand and use different types of data provided by computers (Nisa et al., 2018). Due to the vast amount of information that is widespread in this century, literacy is essential for students to be able to select, evaluate, synthesize, and use the information they obtain from the internet carefully (Redhana, 2019).

For example, a flipbook that contains text, animations, videos, and music. Flipbooks can offer visual and auditory stimuli that improve learners memory. A three-dimensional interactive book with a moving screen is called a flipbook (Lestari, 2022). Flipbooks are also one of the learning tools that are expected to make classes interesting and fun (Wati, 2015). In terms of conveying information, entertainment, and teaching, flipbooks as an audiovisual media are 70% more effective in attracting students interest and attention in supporting student learning and development. Flipbooks can also help students become more skilled in using media, information technology, and information technology to meet the demands of modern abilities (Rokhim,Widarti, 2020).

The results of the experiments that have been carried out show that the science literacy-based flipbook learning media gets an average percentage score of 92% and is included in the very good category. According to the teachers response questionnaire, the media can help students learn and improve students abilities in science literacy. This supports the claim that digital books or flipbooks can help learners learn in school. If done in an effective and efficient way, learning can be fully achieved (Nurwidiyanti & Sari, 2022). According to research conducted by (Noor Mayaminiy Maulidah et al., 2021) this flipbook media has a validity rate of 85.70% with very valid or suitable criteria for use without revision. This media is considered valid, because it meets three criteria for the validity of learning media: format, content, and language. As a result, it can be concluded that this flipbook media can help learning. Interactive learning can help with learning and interaction that focuses on learners and learning resources. This is also in line with the opinion expressed by (Mukarromah et al., 2021) that the results of expert validity tests show that flipbooks have value for educational purposes. Test results show that individuals have an exceptional ability to solve learning problems and can help solve them. Therefore, this research can be expanded or used as a relevant reference.

The results of the researchers interviews with science teachers at SMP Negeri 210 and SMP Negeri 208 in Jakarta revealed that the implementation of the independent curriculum has so far been quite good in schools, although there are still certain problems with its implementation. Students lack of engagement and enthusiasm for lessons are two of these drawbacks. It is very challenging to teach students other skills, especially critical thinking skills. After conducting interviews in the early stages of this developmental research, the researcher looks for ideas or theoretical foundations for the developed learning medium, and to do this, the researcher reads books from various sources (Riani et al., 2015).

Digital learning resources that can significantly enhance learners educational experience and expand their access to a wealth of knowledge and information including web-based learning materials, educational software, learning videos, and interactive platforms (Hsb, 2024).

Therefore, based on existing problems regarding learning media, in order to improve students understanding and digital literacy based on the understanding of local potential regarding the classification of living things, Plantae submatter, Angiosperm submatter, especially the types of medicinal plants used by the Betawi Ciracas community, this research aims to design and develop interactive learning materials in the form of flipbooks. In addition to trying to offer up-to-date information through interactive digital learning resources that can be used while learning, another goal is to provide new information and digital teaching resources to help students learn, which is another advantage of this study.

METHODOLOGY

The Research and Development (R&D) method was employed in this study to design a specific educational product and evaluate its effectiveness. The development process was tailored to align with the researchers' objectives, with a primary focus on the initial product revision phase. This phase encompassed conducting literature reviews relevant to the identified issue, assessing the necessity of the research, performing small-scale preliminary studies, and outlining a research framework. The initial problem identification involved structured interviews with two junior high school science teachers, using pre-formulated questions. Additionally, student perceptions were captured through questionnaires (Ani & Lazulva, 2020).

The R&D process followed a sequence that included problem identification, formulation of objectives, product design and development, product testing, evaluation of outcomes, and dissemination of findings. The problem identification stage incorporated interviews, observations, and issue mapping. A clear articulation of development objectives was also established in this phase (Aini et al., 2024).

This study utilized both qualitative and quantitative data. Qualitative data were derived from expert critiques and suggestions provided by validators and trial participants. Quantitative data were obtained from validation results by four experts—two subject matter experts and two media experts—as well as from small-scale trials involving 10 students, followed by a larger implementation with 36 students. The validation sheets and user feedback instruments were central to data collection and analysis (Nugroho & Pertiwi, 2017).

The ADDIE development model was selected due to its systematic, structured sequence, which aligns well with multimedia instructional design. This model was conceptualized by Reiser and Molenda, who offered different representations of ADDIE. Reiser described the model using action-oriented verbs (Analyze, Design, Develop, Implement, Evaluate), emphasizing its iterative nature and revision stages. Conversely, Molenda presented the framework using nouns, focusing on its component-based structure (Hidayat et al., 2021). Widely adopted in instructional development, ADDIE offers a comprehensive framework that ensures a logical and methodical approach to educational media design (Anantyarta & Sholihah, 2020; Sugihartini & Yudiana, 2018).

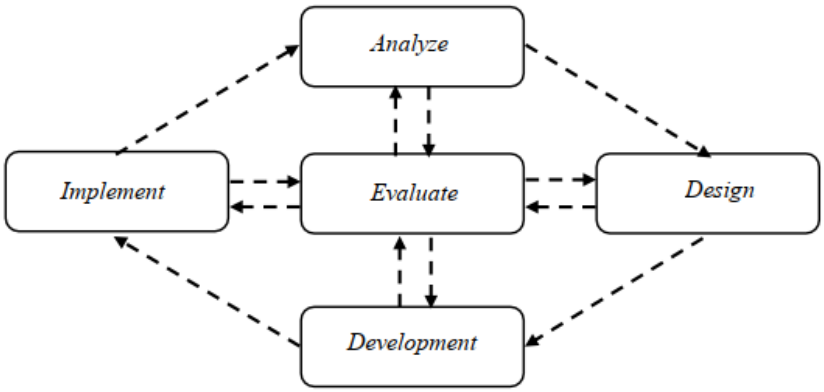

Figure 1. Stages of the ADDIE Model

This development research adopts a procedural model that outlines a systematic sequence of steps in the product development process. The primary product developed is an interactive flipbook—an electronic book (e-book) that integrates multiple forms of media, including text, images, audio, video, and audiovisual elements. The content and design of this flipbook are subject to expert validation, specifically by subject matter experts and instructional media specialists, to ensure its accuracy, relevance, and pedagogical effectiveness.

Analyze Stage

The analyze stage represents the initial phase of the development process, during which a needs analysis is conducted to examine the background of the subject matter and determine the requirements for appropriate learning media. This step aims to obtain a comprehensive understanding of the educational needs of both teachers and students regarding the use of instructional tools. In this study, data were gathered through structured interviews with two junior high school science teachers.

The interview results revealed that the current use of learning media is largely limited to conventional tools such as PowerPoint presentations. Teachers expressed concerns about the lack of variety and interactivity in their instructional methods, often describing their classes as monotonous and overly teacher-centered. This approach, which relies heavily on verbal explanation, was reported to reduce student engagement and enthusiasm during lessons (Muharni et al., 2021). To support the analysis, a survey instrument was also developed and distributed to subject matter experts. The aim was to assess the current utilization of digital media in teaching and to evaluate the perceived need for interactive flipbook-based learning tools (Anantyarta & Sholihah, 2020).

Design Stage

The design stage involves the formulation of a detailed plan for developing the interactive flipbook, grounded in pedagogical objectives and user needs identified during the analysis phase. This stage includes determining the structural components of the flipbook, such as the cover page, preface, learning objectives, indicators, table of contents, user instructions, an introduction to ethnobotany, classification and functions of medicinal plants, interactive quizzes (via Quizizz), a glossary, bibliography, and author profile.

The development began with the compilation of relevant content and supporting materials, which were then organized into an intuitive product layout suitable for student use. Each page of the flipbook includes combinations of text, images, and interactive elements to facilitate

engagement and comprehension. The background and slide themes were deliberately selected using the Canva platform to align with the material on biological classification—specifically, the Plantae kingdom and Angiosperm subdivision. The design emphasizes medicinal plants traditionally utilized by the Betawi Ciracas community, thereby integrating local knowledge into the science curriculum.

Additionally, validation instruments were created to assess the accuracy and feasibility of the product. These included validation sheets targeted at both content experts and instructional media experts. Figure 2 illustrates the initial prototype of the interactive flipbook, showcasing the front cover as the entry point to the digital learning experience.

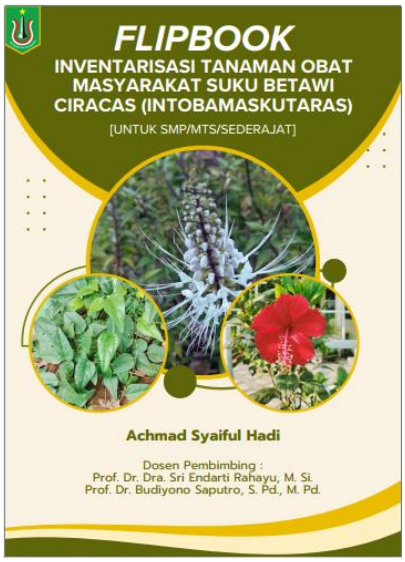

Figure 2. Cover Initial Appearance

On the subsequent page, a second cover page is presented. This page includes detailed acknowledgments of the key contributors involved in the development of the learning media. Specifically, it lists the name of the compiler, editor, supervisor, material expert, and media expert, thereby recognizing the collaborative effort and expertise integrated into the creation of the flipbook. Figure 3 illustrates the layout of this second cover page, serving both as a formal acknowledgment and as part of the structured documentation within the interactive learning media.

Figure 3. Author Name Cover Display

On the following page, a preface page is presented. This section includes a written preface as well as expressions of appreciation and gratitude extended to various individuals and institutions that have contributed to the development of the flipbook. The acknowledgments reflect the collaborative efforts that supported the creation of this interactive learning media. Figure 4 presents the visual layout of the preface page, which serves to introduce the purpose of the flipbook and honor those involved in its development.

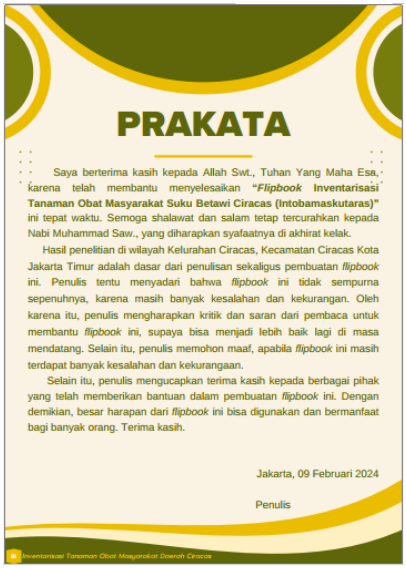

Figure 4. Preface Page View

On the subsequent page, a learning achievement display is presented. This section outlines both general learning objectives and specific element achievements related to the comprehension of science content. These objectives are aligned with curriculum standards and are intended to guide students toward measurable learning outcomes in the subject matter. Figure 5 illustrates the layout of this page, showcasing how the expected competencies are clearly communicated to support the learning process.

Figure 5. Learning Outcomes Page View

On the following page, a display of learning indicators and objectives is presented. This section outlines the core learning competencies and the expected learning objectives to be achieved by students upon completing the instructional activities. These indicators serve as measurable benchmarks that guide both teaching and assessment processes, ensuring alignment with the desired educational outcomes. Figure 6 presents the visual layout of this page, emphasizing the clarity and coherence of the learning goals.

Figure 6. Indicator Page View and Learning Objectives

On the subsequent page, a Table of Contents is presented, providing a structured overview of the content within the flipbook. This section lists the major topics and corresponding page numbers, enabling users to easily navigate through various sections of the material. The inclusion of a clear and organized table of contents enhances the usability and accessibility of the flipbook for both teachers and students. Figure 7 illustrates the visual layout of the Table of Contents page.

Figure 7. Table of Contents Page View

On the subsequent page, the Instructions for Use section is displayed. This section provides detailed guidance on how users can access, navigate, and interact with the contents of the flipbook. Clear instructions are essential to ensure that both students and educators can utilize the digital

learning material effectively and independently. It outlines the technical requirements, step-by-step usage directions, and suggestions for optimal engagement with multimedia elements such as text, images, videos, and quizzes embedded in the flipbook. Figure 8 presents the visual layout of the Instructions for Use page.

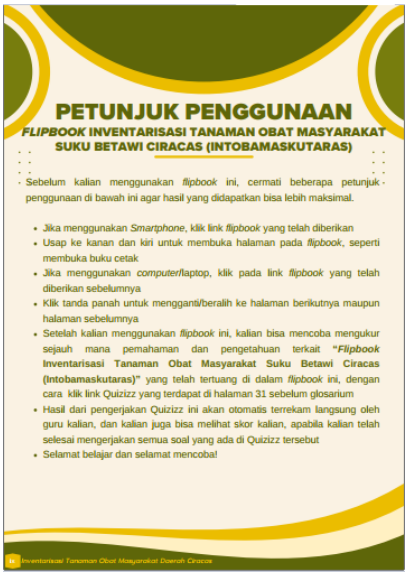

Figure 8. How to Use Page View

On the next page, a display of real conditions is presented, which contains about the real conditions of the daily life of the Betawi Ciracas tribal community, in terms of using medicinal plants as medicine. Figure 9 is presented in the following image:

Figure 9. Page View of The Real Condition of The Betawi Ciracas Tribe

On the next page, an introductory display is presented, which contains an introduction to the meaning of learning media, flipbooks, ethnobotany, and medicinal plants. Figure 10 is presented in the following image:

(a) **(b)**

Figure 10. Page View (a) Media Introduction; (b) Introduction to Ethnobotany

On the next page, a display of the classification of various types of medicinal plants is presented, with various characteristics, taxonomy, benefits and ways of using medicinal plants. Figure 11 is presented in the following image:

(a) **(b)**

Figure 11. Medicinal Plant Classification Page View
(a) Avocado; (b) Ginger

On the next page, a display of instructions for working and access to quizizz is presented, as a form of interactive assessment. Figure 12 is presented in the following image:

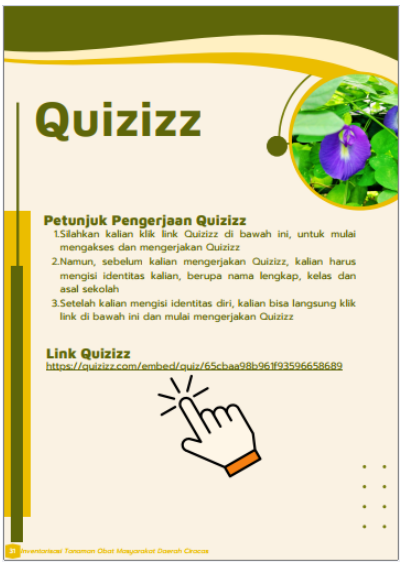

Figure 12. Display of the Quizizz Instructions Page

On the next page, the quizizz page is presented. Figure 13 is presented in the following image:

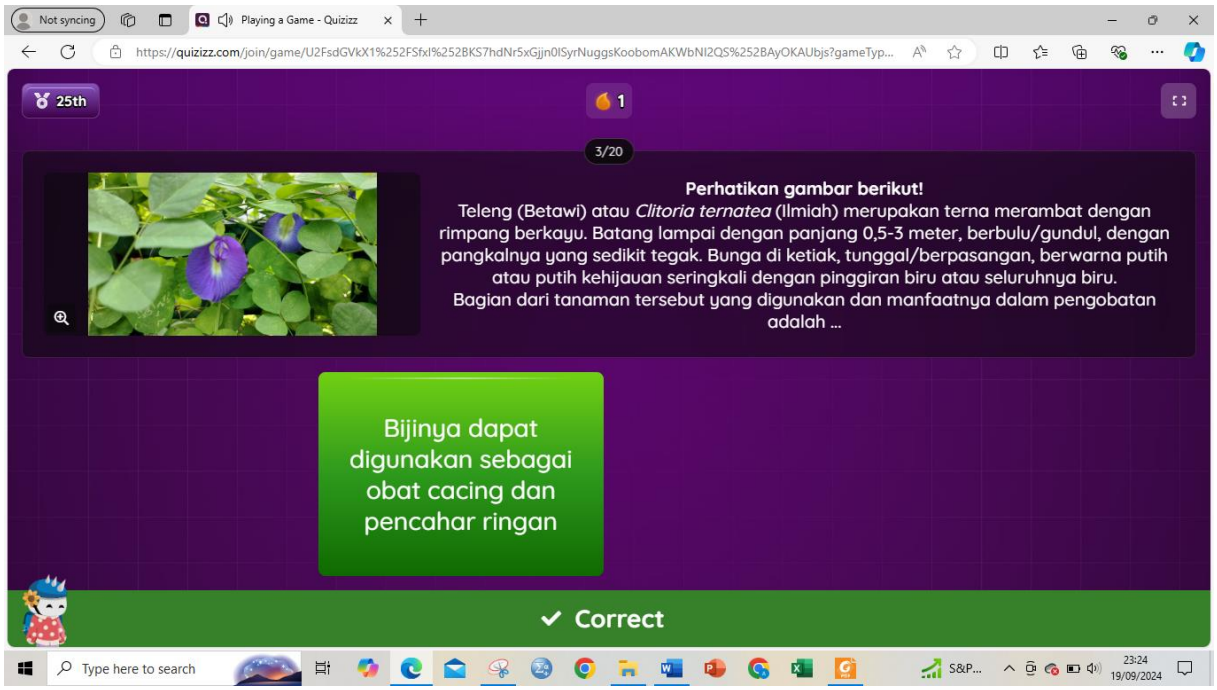

Figure 13. Quizizz Page View

On the next page, a glossary display is presented which is a page that contains various kinds of terms contained in the flipbook. Figure 14 is presented in the following image:

Figure 14. Glossary Page View

On the next page, a bibliography display is presented which is a page that contains various kinds of references used as a reference for the material contained in the flipbook. Figure 15 is presented in the following image:

Figure 15. Bibliography Page View

On the next page, the authors profile display is presented which is a page that contains information about the authors biodata, a brief description of other personal data. Figure 16 is presented in the following image:

Figure 16. Author Profile Page View

Development Stage

The third stage is Development, which involves the actual realization of the product based on the designs established in the previous phase. During this stage, all components designed earlier are fully assembled and transformed into a complete and functional product (Muharni et al., 2021). The finished flipbook is compiled into a unified format using the Heyzine Flipbook platform, a process often referred to as extracting.

Following the compilation, the developed product is distributed to both subject matter experts and media experts for validation. To facilitate an objective evaluation of the product's quality, assessment instruments in the form of structured questionnaires are provided. These instruments are designed to assess various aspects of the product, including content accuracy, relevance, clarity, presentation, and media design. The validation from these experts serves as the foundation for identifying any necessary revisions before the product is implemented in a learning context as explained in table 1.

Table 1. Product Assessment Instruments by Material Experts

No.	Indicators
A.	**Introduction Aspects**
1.	Clarity of learning instructions for students
2.	Clarity of learning outcomes, indicators and learning objectives with the material discussed
B.	**Content/Material Aspects**
1.	Completeness of learning materials with systematic order and arrangement
2.	Accuracy of material definitions and concepts
3.	Accuracy of the library used
4.	The material in the flipbook is easy for students to understand
C.	**Presentation Aspects**
1.	The material presented in the flipbook is in accordance with the development of junior high school students thinking
2.	Flipbooks are presented consistently, concisely and neatly
D.	**Language Aspects**
1.	Conformity with good and correct Indonesian rules
2.	The sentences used to explain the material are easy for students to understand
3.	The language used is in accordance with the level of development of students thinking
4.	Sentences used in flipbooks do not give rise to double meanings
E.	**Characteristic Aspects**
1.	There are examples of images of local potential found
2.	The material presented is in accordance with the learning objectives and is associated with the local potential found
3.	The material presented can add students insight into the local potential in their school area

For learning media experts, questionnaire instruments, assessments to evaluate products by learning media experts are also given, as follows:

Table 2. Product Evaluation Instruments by Media Experts

No.	Indicators
A. Graphics Components	
1.	The variety of fonts used is not excessive
2.	Flipbook size conforms to ISO standard
3.	The display of layout elements on the cover page, body page and back page is unified and consistent
4.	Proportional flipbook layout view
5.	The colors used on the cover page match the flipbook theme
6.	The colors used in the entire flipbook can provide a feel that explains the contents of the flipbook
7.	The display of the images presented in the flipbook is attractive
8.	The images and photos presented are of good quality
B. Media Components	
9.	The design featured on the flipbook cover is attractive
10.	The cover design explains the overall content of the flipbook
11.	Design the content of the flipbook is proportional and attractive
C. Language Components	
12.	The use of sentences is clear and does not cause double meaning for students
13.	Communicative language
14.	The use of terms in the flipbook is easy to understand
D. Components of Use	
15.	The use of clear sentences that do not cause ambiguity for students.

Development research is a methodological approach employed to design and produce a specific product. In this context, the development process is supported by various data collected through validation instruments that are specifically designed to assess the accuracy, effectiveness, and appeal of the product. The gathered data not only provides quantitative measures but is also complemented by expert feedback, offering critical commentary, suggestions, and constructive input to enhance the flipbook through descriptive analysis. To ensure the validity of the developed flipbook, data analysis is carried out systematically. In this study, a Likert scale model is employed to evaluate expert assessments via a structured questionnaire. This scale includes four response options: 1 = Invalid, 2 = Less Valid, 3 = Valid, and 4 = Very Valid. To analyze the validation results quantitatively, the following formula, adapted from Sugiyono (2017) is applied. This formula allows raw validation data to be converted into a percentage value, which can then be interpreted according to predefined categories (e.g., very valid, valid, less valid, or invalid). In this way, the quality of the product can be reliably measured before proceeding with implementation or further refinement.

$$P = \frac{\sum \text{assement score}}{\sum \text{maximum score}} \text{ x } 100\% \quad (1)$$

Furthermore, the results of the validation of media experts and material experts are interpreted using the following score interpretation table:

Table 3. Validation Criteria by Percent

No.	Percentage	Interpretation
1.	Score ≥76%	Highly Valid
2.	51% - 75%	Valid
3.	26% - 50%	Less Valid
4.	Score ≤25%	Invalid

Implementation Stage

The subsequent step involves piloting interactive learning media in the form of a flipbook documenting the medicinal plant inventory of the Betawi Ciracas community, targeted at both teachers and seventh-grade students in junior high school. In this context, a trial was conducted with 10 students from Grade VII at SMP Negeri 210 Jakarta. In addition to the student participants, the researcher also sought feedback from teachers regarding the interactive flipbook, specifically focusing on its effectiveness and engagement in conveying the Betawi Ciracas medicinal plant inventory.

Evaluation Stage

The evaluation process is essential to assess whether the developed learning system functions as intended and meets the established expectations. It is important to note that evaluation is not confined to the final stage but can be applied throughout all four phases of the instructional design process. In this case, the primary purpose of evaluation at this stage is to facilitate revisions, hence it is categorized as a formative evaluation. This evaluation represents the culminating step of the ADDIE learning system design model, serving as a critical process to determine the overall value and impact of the learning program (Trisiana & Wartoyo, 2016).

RESULT AND DISCUSSION

The research data for this development study is derived from the validation results of the media product, as assessed by two experts: subject matter experts and media experts. The validation scores from the subject matter experts are summarized in Table 4.

Table 4. Results of Material Validation by Teachers and Lecturers on Flipbooks

No.	Assessment Aspects	Percentage (%)	Category
1.	Introduction	75	Valid
2.	Contents/Materials	93,75	Highly Valid
3.	Presentation of Materials	87,5	Highly Valid
4.	Linguistics	96,87	Highly Valid
5.	Characteristic	91,66	Highly Valid
	Average percentage	**90,83**	**Highly Valid**
	Validator verdicts	**Worth using with minor revisions**	

(Source: Researcher Data, 2024)

Based on the data presented in Table 4, the validation results from the subject matter experts revealed an average score of 90.83%. The breakdown of the validation for each aspect is as follows: the initial aspect received 75%, the content/material aspect scored 93.75%, the material presentation aspect was rated at 87.5%, the language aspect achieved 96.87%, and the characteristic aspect scored 91.66%. These results indicate that the content within the interactive learning media, particularly the flipbook, is highly valid and well-received. Table 5 presents the data validated by media experts.

Table 5. Results of Media Validation by Teachers and Lecturers on Flipbooks

No.	Assessment Aspects	Percentage (%)	Category
1.	Graphics	95,31	Highly Valid
2.	Media	95,83	Highly Valid
3.	Language	95,83	Highly Valid
4.	Use	87,5	Highly Valid
	Average percentage	**91,36**	**Highly Valid**
	Validator verdicts	**Worth using with minor revisions**	

(Source: Researcher Data, 2024)

Based on the data presented in Table 5, the validation results from media experts revealed an average score of 91.36%. The individual aspects are as follows: the graphic aspect received a

score of 95.31%, the media aspect scored 95.83%, and the usability aspect was rated at 87.5%. These results indicate that the interactive learning media, such as the flipbook, is categorized as very valid.

The interactive flipbook has been designed and tested on a small scale. This pilot trial was conducted to evaluate various aspects of the flipbook, including its material, language, and overall appearance, specifically focusing on the medicinal plants of the Betawi Ciracas tribe. The trial involved both teachers and students, who provided feedback on the flipbook. The teachers' responses regarding the readability of the flipbook are summarized in Table 6.

Table 6. Results of Teachers Responses to The Readability of Flipbooks

No.	Assessment Aspects	Percentage (%)	Category
1.	Material	100	Highly Valid
2.	Linguistics	100	Highly Valid
3.	Display	95,83	Highly Valid
	Average percentage	**98,61**	**Highly Valid**

(Source: Researcher Data, 2024)

The results of the flipbook validation test conducted by teachers reached an impressive average of 98.61%, falling within the "very good" category. These results indicate that teachers highly evaluated the flipbook, deeming it suitable for further testing on a larger scale. In addition, a readability test of the flipbook was conducted with 10 seventh-grade students. The results of this test, as obtained from the students, are presented in Table 7.

Tabel 7. Results of Students Responses to The Readability of Flipbooks

No.	Assessment Aspects	Percentage (%)	Category
1.	Material	89,16	Highly Valid
2.	Linguistics	81,66	Highly Valid
3.	Display	86,11	Highly Valid
4.	Use	96,66	Highly Valid
	Average percentage	**89,02**	**Highly Valid**

(Source: Researcher Data, 2024)

The results of the interactive flipbook readability test, conducted with ten students, revealed that the **usability aspect** received the highest average score of 96.66%. This suggests that students found the flipbook easy to use, useful for accessing information from reliable sources, and effective in increasing their interest in the classification of living organisms. This finding aligns with the idea that content is best delivered when the language used is communicative and easily understandable by students. Additionally, the **visual aspect** received a commendable average score of 86.11%, placing it in the superior category. Students rated the flipbook's presentation, color usage, and overall image quality highly, noting that the flipbook's design—with its well-chosen fonts, colors, and visuals—made it appealing and engaging. This supports the assertion by Andhani et al.(2021), who suggest that when creating teaching materials, it is preferable to limit the use of font combinations to avoid distracting students from the core content.

The small-scale version of the flipbook has been customized and found to be effective once students reported it as easy to read. Following this, a **practicality test** was conducted to assess the overall practicality of the flipbook. The teachers' responses to this test are summarized in Table 8.

Table 8 Results of Teachers Responses to The Practicality of Flipbooks

No.	Assessment Aspects	Percentage (%)	Category
1.	Effectiveness	95	Very Practical
2.	Interactive	93,75	Very Practical
3.	Use	100	Very Practical
4.	Creative	100	Very Practical
5.	Utilization	100	Very Practical
	Average percentage	**97,75**	**Excellent**

(Source: Researcher Data, 2024)

The flipbooks received an average practicality score of 97.75%, placing them in the "very useful" category. Teachers found the flipbooks to be effective, interactive, creative, and highly practical for use in the classroom. These results indicate that the flipbooks are a valuable tool for enhancing learning experiences. The students' responses to the practicality of the flipbooks are summarized in Table 9.

Table 9. Results of Students Responses to The Practicality of Flipbooks

No.	Assessment Aspects	Percentage (%)	Category
1.	Ease of Use	95,58	Very Practical
2.	Attractiveness of Presentation	93,41	Very Practical
3.	Benefits	85,55	Very Practical
	Average Percentage	**97,75**	**Excellent**

(Source: Researcher Data, 2024)

The results indicate that the flipbooks are highly practical across three key components: ease of use, attractive presentation, and overall usability. The ease of use aspect received a score of 95.58%, demonstrating that students found the flipbooks very user-friendly. The presentation appeal aspect scored 93.41%, suggesting that the flipbook's design and visual presentation were highly engaging and effective. The usability aspect received a score of 85.55%, indicating that the flipbook is highly practical in terms of its functionality and ease of interaction. Overall, the flipbooks were rated very practical for answering questions, with an impressive average score of 97.75% based on learners' assessments. This shows that the flipbook is not only an effective learning tool but also well-received by students in terms of its functionality and engaging design.

Table 10. Results of Students Responses to The Practicality of Flipbooks

No.	Assessment Aspects	Percentage (%)	Category
1.	Ease of Use	95,58	Very Practical
2.	Attractiveness of Presentation	93,41	Very Practical
3.	Benefits	85,55	Very Practical
	Average Percentage	**97,75**	**Excellent**

(Source: Researcher Data, 2024)

The use of this interactive flipbook has been highly appreciated by students, who reported a better understanding of the learning material and found it easy to use. This highlights the potential of various methods to foster 21st-century skills, including critical thinking, creativity, teamwork, and communication. Approaches such as team-based project learning and case studies are examples of strategies that promote these skills (Handayani et al., 2024). In 21st-century learning, which is learner-centered, students actively engage in the learning process, while the teacher facilitates their exploration and understanding. Interactive flipbooks serve as a tool that enhances student involvement in this process (Khaeruddin, 2017). By incorporating contemporary learning media and resources, interactive flipbooks can play a significant role in developing 21st-century skills in learners.

This aligns with research by Firdaus et al.(2024), which demonstrated that digital-based interactive modules are effective in helping students develop 21st-century skills. Their study emphasized that validated interactive modules enhance learners' abilities, particularly in digital literacy and comprehension. Additionally, Febliza et al. (2023) found that using interactive web tools and videos can support the development of critical thinking, a key 21st-century skill. Similarly, the present research suggests that creating interactive flipbooks can help students acquire modern skills related to digital literacy and comprehension.

The interactive flipbook developed in this study is novel, especially for junior high school students, as it addresses material that has not been extensively developed for this age group. The

Indonesian independent curriculum explicitly requires students to learn digital literacy and science as part of their education, highlighting the need for prospective educators to be well-versed in adolescent development, particularly at the junior high school level.

Interactive flipbooks can be valuable for teachers, lecturers, and educational practitioners in designing engaging, interactive teaching materials that support both students and future educators in understanding the content. By offering a combination of materials, challenges, problem-solving tasks, and links to online discussion forums and assessments, interactive flipbooks promote critical thinking, creativity, collaboration, and communication. Future iterations of flipbooks could further incorporate 21st-century skills, including the 6Cs: critical thinking, creativity, cooperation, collaboration, character, and citizenship.

CONCLUSION

The research and development findings demonstrate that the Betawi Ciracas community medicinal plant inventory flipbook can serve as an effective interactive learning material. Data analysis shows that the flipbook is highly validated, with 90.83% from material experts and 91.36% from media experts falling into the "very good" or "very valid" category, according to the score intervals. Additionally, teachers' and students' feedback regarding the practicality of the flipbook reveals an impressive 97.75% assessment in terms of its usefulness, indicating that it is highly practical and beneficial.

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