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The Development of Digital Pocketbook Media Based on Inquiry on Plant Growth Materials Elementary School Students

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Abstract: The purpose of this study was to develop media, to determine the feasibility and effectiveness of an inquiry-based digital pocketbook in improving students' scientific literacy skills. This research is a development research or Research and Development (R&D) method. Research and development consist of 10 steps, namely, 1) Potential and problems, 2) Data collection, 3) Product design, 4) Design validation, 5) Design revision, 6) Product trial, 7) Product revision, 8) Usage trial, 9) Product revision, and 10) Mass production. Data collection techniques used are test techniques, interviews, and questionnaires. In comparison, the data obtained in this study is quantitative and qualitative, including learning observations, product validation, and student interest in learning. The data sources in this study were sixth-grade students and elementary school teachers in Toroh District, Grobogan Regency. The design for developing an inquiry-based digital pocketbook that the researcher has set consists of 3 parts: planning, process, and content. The feasibility of the product is seen from the validation results of material experts, media experts, and linguists. From the material expert validation process, the average results obtained are 3.47 with a percentage of 86.75% in the very appropriate category, media expert validation obtains an average result of 3.83, a percentage of 95.75% in the very feasible category, and the validation of linguists obtains the results an average of 3.45 percentage 86.25% with a very decent category. Furthermore, the products developed can improve students' scientific literacy skills. This is indicated by student learning outcomes that reach a 99% completeness level with a very high category. Based on the validation results and strengthened by student learning outcomes, this inquiry-based digital pocketbook is effectively used as a learning medium to improve the scientific literacy skills of class VI students in Toroh District, Grobogan Regency. This research implies that teachers can find and develop learning media needed to improve learning outcomes by achieving learning objectives and instilling character education. In addition, this research can be used as a reference for developing similar teaching materials but with different variables according to the indicators of the essential competencies to be achieved, not only in grade VI elementary school but at other grade levels.

Keywords: Pocketbook, inquiry approach, student scientific literacy

1. Introduction

The teaching and learning process is a process of communication between teachers and students and reciprocity in terms of knowledge transfer. In learning communication, sometimes students have difficulty understanding the material presented by the teacher. In this case, because learning tends to be verbal, students are less interested in participating in education. Therefore, teachers must understand the learning process as well as possible to provide guidance and an appropriate and suitable learning environment for students. In line with the opinion of Shuhratovich (2020), there is a need for innovation in the learning process to generate interest and motivation in student learning, reduce or avoid verbalism, generate regular, systematic reasoning, foster understanding, and develop values in students.

In the teaching and learning process, it is necessary to have a learning design that has the following characteristics: 1) Develop a balance between spiritual and social attitudes, knowledge, and skills, and apply them in various situations at school and the community, and 2) Provide sufficient time freely to develop various attitudes, knowledge, and skills. The 2013 curriculum aims to prepare Indonesian people who are faithful, productive, creative, innovative, and practical, according to Fahrurrozi, Sari, & Rahmah (2022), where the 2013 Curriculum emphasizes student-centered learning (student-centered learning) so that learning becomes inspirational and fun. Motivating students to be more active in

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learning in class requires learning media, which has a crucial position, namely as a representative of the teacher's explanation in front of the class.

Currently developing various types of media that can be used in learning, one of which is printed media. Print media includes materials prepared on paper for teaching and information. Besides textbooks or textbooks (Karmintoro et al., 2021). Textbooks are still the primary source of information in the learning process, both for teachers and students. Textbooks can be developed into a pocketbook or better known as a pocketbook. According to Samala et al. (2021), Pocketbooks are small books that can be stored in a pocket and easily carried everywhere. In appearance of this pocketbook, it is equipped with pictures that support the material and color to give an attractive appearance. Students like interesting readings with few descriptions and images or colors (Kaniawati, Abidin, & Rakhmayanti, 2021).

The results of the analysis of teachers need to be found in the field. Based on the interviews, most teachers need learning media to help the learning process. Based on the results of a questionnaire analysis of the need for inquiry-based digital pocketbook learning media in science subjects about plant reproduction, for elementary school teachers in Toroh District, on Saturday, July 10, 2021, the researchers concluded that teachers still use conventional teacher-centered learning methods (teacher-centered), not based on direct experience around students and with less interesting learning media. In addition, the teacher realizes the importance of learning media in delivering subject matter as a support for implementing a good learning process to achieve learning objectives.

Efforts to support student learning, namely the development of a digital pocketbook, are collaborated using an inquiry-based approach. Yulina et al. (2019) state the series of learning activities that emphasize the process of analytical thinking to seek and find the answer to a problem in question. The thinking process itself is usually carried out through questions and answers between the teacher and students. I find that this strategy is called the heuristic strategy, which comes from the Greek heuristic. An inquiry-based approach involves active activities and skills in searching for knowledge or understanding (Winanto & Makahube, 2016). This inquiry-based approach is student-centered by conditioning students to control the situation (Septiani & Susanti, 2021). The inquiry-based approach is supported by research by Duran & Dökme (2016), which shows that the use of an inquiry approach through recitation and experimental methods has a significant effect on knowledge and skills.

Based on the explanation above, it is hoped that the pocketbook, in collaboration with the inquiry approach, can be used in the learning process to determine students' scientific literacy skills. Scientific literacy is the ability to use science, identify questions, and draw conclusions based on the evidence obtained. According to Narut & Supardi (2019), someone who has scientific and technological literacy is characterized by having the ability to solve problems using scientific concepts brought in education according to their level, getting to know specialized products around them and their impacts, being able to use technological developments and maintain them, creative in making simplified technical results so that students can make decisions based on the values and culture of the community. Science education aims to increase students' competence to meet their life needs in various situations, including facing multiple challenges of life in the global era. With scientific literacy, students will be able to learn further and live in a modern society currently heavily influenced by the development of science and technology. According to Roberts & Bybee (2014), scientific literacy can develop and improve some self-ability by providing explanations about concepts that are understood and applying them in everyday life. High literacy skills can also encourage the development of science and technology to a higher level (McFarlane, 2013).

Based on the explanation above, it is suspected that inquiry-based digital pocketbook media can improve students' scientific literacy skills. The research results reinforce this by Febriani et al. (2022), proving that digital pocketbook media based on Augmented Reality are feasible and practical for learning mathematics. This research is also based on the research of 1) Harun et al. (2021), who aim to produce qualified and effective media to improve the social care character of elementary school students, 2) Saputra et al. (2018), who aim to develop learning media in the form of a mobile pocketbook. Which is feasible and effective to use in learning, 3) Friansah, Adha, & Refianti (2018) and Sukroyanti (2016) state that students are more interested in pocketbooks that look more realistic.

The results of this previous study are a reference in this study. This study has similarities with the research above, namely using a pocketbook, but what makes it different is that the author wants to develop an inquiry-based digital pocketbook media. Furthermore, the author will try to create this media relevant to the needs of the material and the age level of students, especially in science subjects and plant reproduction materials.

2. Literature Review

A pocketbook is a small book containing information that can be stored and is easy to carry everywhere. Pocketbooks are not only used in printed form but can be used in digital form. The digital pocketbook learning media has advantages, including 1) It makes it easier for students to learn, 2) It makes it easier for students to access it anywhere and anytime, and 3) It is not easily damaged because it is in the form of software, and 4) Saves space because it does not require much internal storage space (Anita et al., 2021). The advantages of this digital pocketbook media are supported by research (Juniarti, Septianawati, & Hodiyanto, 2021), which shows that mobile pocketbooks are suitable to support science learning because the media developed are effectively used as science learning media.

According to Winanto & Makahube (2016) & Septiani et al. (2021) that the inquiry learning model is a series of learning activities that emphasize the process of thinking critically and analytically to seek and find the answer to a

question in question. The thinking process is usually done through questions and responses between the teacher and students. The reason for using inquiry is that by finding out for yourself about the concepts being studied, students will better understand the science, and the knowledge will last a long time.

Scientific literacy is the ability to use scientific knowledge, identify questions, and draw conclusions based on evidence to understand and make decisions regarding nature and changes made to nature through human activities (Narut & Supardi, 2019). Scientific literacy consists of the words literatus, which means literacy, and Scientia, which means knowledge. Scientific literacy is the ability to use scientific knowledge, identify questions, and draw conclusions based on evidence to understand and make decisions regarding nature and changes made to nature through human activities (Pertiwi, Atanti, & Ismawati, 2019). According to Effendi et al. (2021), scientific literacy is the capacity to use scientific knowledge, identify questions, and draw evidence-based conclusions to understand and help make decisions about the natural world and the changes made to it through human activity.

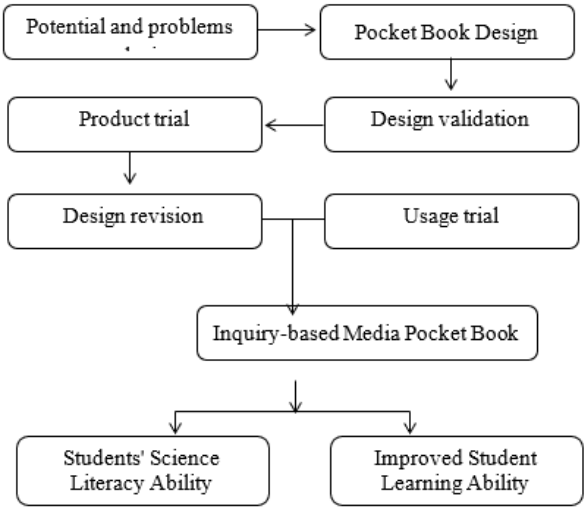


Figure 1. Research thinking framework

The thinking framework is defined as a diagram that acts as a flow of what will be conveyed. According to Elsbach & Stigliani (2018), the framework of thinking is defined as a diagram that acts as a systematic logic flow for the theme written. Varpio et al. (2020) put this for research purposes where the thinking framework is based on research questions.

The quality of science learning is influenced by several factors: teachers, students, and the environment. These three things must work in synergy to increase science learning quality. In this case, researchers need to create a frame of mind to make classroom learning practical and fun. The quality of learning in this study also focused on science learning outcomes on plant breeding material, where plant reproduction is one of the most challenging materials for students. This is evidenced by the average value of learning outcomes obtained by students is still less than the criteria of completeness set by the teacher. By looking at the conditions above, the researchers made learning media in the form of a digital pocketbook about plant breeding materials so that students easily understand the material that has been delivered.

3. Methodology

The research method is the Research and Development method with the Borg and Gall development models. The research and development steps consist of 10 steps as follows: 1) Potential and problems, 2) Data collection, 3) Product design, 4) Design validation, 5) Design revisions, 6) Product trials, 7) Product revisions, 8) Usage trials, 9) Product revisions, and 10) Mass production manufacturing (Sugiyono, 2017). The research design can be seen in Figure 1. In this study, the experimental subjects studied were sixth-grade elementary school students in Toroh District. The data types are qualitative and quantitative, namely questionnaires and interviews. The data analysis technique used is descriptive qualitative and quantitative analysis.

Sources of data to identify initial needs in this study were teachers and sixth graders of elementary schools in the Pilangpayung area, Toroh District, Grobogan Regency, in the odd semester of the 2021/2022 academic year. Therefore, the subjects of this study were sixth-graders at State elementary school 3 Pilangpayung, Public Elementary School No. 1 Sugihan, and Public Elementary School No. 2 Krangganharjo. Meanwhile, the population of this study was 30 students.

The data used are quantitative and qualitative (used mixed method). This data is used to describe the validation results of experts and material experts. In addition, to measure the value generated after using an inquiry-based digital pocketbook media, 1) Quantitative data comes from the questionnaire and test scores. 2) Qualitative data comes from suggestions for improvement from validation questionnaires filled out by display design experts, material experts, and audience observation sheets filled out when students use digital pocketbook media.

Activities in data analysis are; grouping data based on variables and types of respondents, tabulating data based on variables from all respondents, presenting data for each variable studied, performing calculations to formulate problems, and performing calculations for hypotheses that have been proposed. The data analysis in the development of inquiry-based Media Pocket Books to improve students' literacy skills include 1) data prerequisite test, namely normality test and homogeneity test, 2) hypothesis testing analysis, namely validity test analysis by using SPSS and feasibility test, 3) test the effectiveness by using t-test analysis.

4. Results

4.1 Needs Analysis

The low scientific literacy ability of students is one of the problems that teachers encounter in learning science. The sixth-grade teacher in the interview said that students understand explanations and memorization, but students' scientific literacy skills in learning science are still having difficulties.

4.2 Planning

The planning carried out several steps as follows.

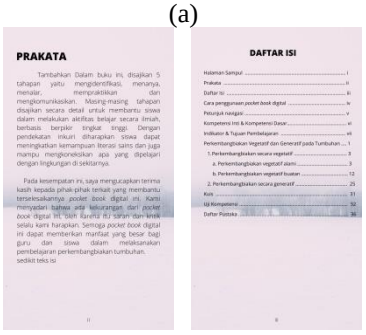
a) Formulate Goals
   The purpose of writing this digital pocketbook is to improve scientific literacy in science lessons on plant reproduction materials.
b) Analysis of Student Characteristics
   Analysis of student characteristics is intended to find out what student characteristics need to be improved.
c) Curriculum Analysis
   At this stage, the researcher analyzes the curriculum, including Graduate Competency Standards (SKL), Content, and Process Standards.
d) Gather Material Resources
   This activity was carried out with discussions with class VI teachers, supervisors, and colleagues, which were carried out separately and gradually. It is intended that the products developed are by the curriculum and student characteristics. The digital pocket book contains science material packaged in applications that can be opened via smartphones, laptops, and PCs.

4.3 Media Development

Open the address of the page or website https://online.flipbuilder.com/dybqv/pfsg/ or install a pocketbook application.

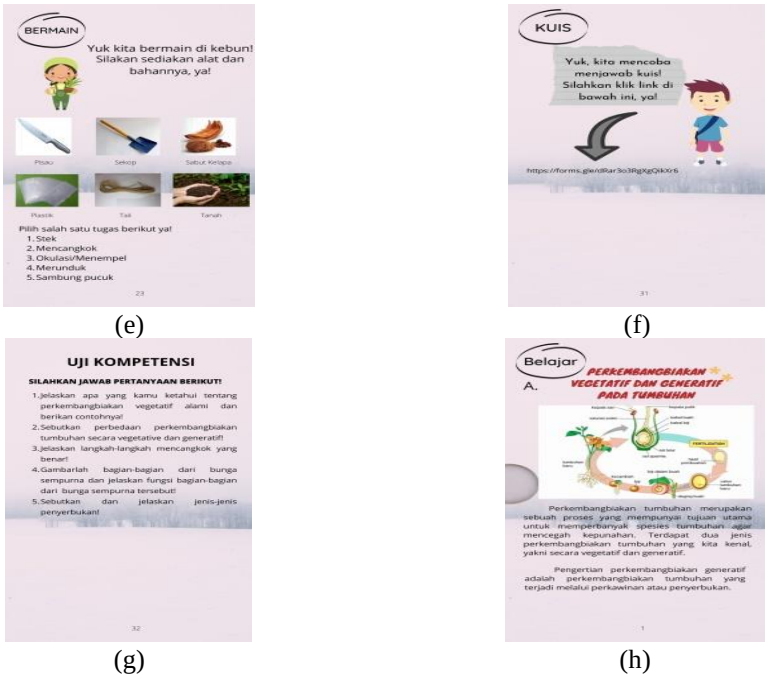
(a)

(b)



(c)

(d)



(e) (f)

(g) (h)

Figure 2. (a) cover page; (b) Title page; (c) Preface and table of contents; (d) Study menu page; (e) Play menu page; (f) Quiz menu page; (g) Competency test page; (h) Study menu page

4.4 Eligibility of Inquiry-Based Digital Pocket Book

Eligibility of Inquiry-Based Digital Pocket Book. The feasibility assessment is carried out after the inquiry-based digital pocketbook has been compiled. The feasibility assessment was carried out using a validation sheet by a linguist, namely Dr. Drs. Moh. Kanzunnudin, M.Pd., material experts namely Kustomo, S.Pd.M.Pd and Dr. Eko Sudarmanto, M.Sc as a media expert.

The feasibility assessment by linguists includes two aspects, namely, the suitability of the material text and the suitability of the language. The average score of the linguists' assessment results can be seen in Table 2.

Table 2. Assessment results of linguists

No.	Assessment Aspect	Score	Category
1	Material Text Compatibility	3.4	Very Valid
2	Language Compatibility	3.5	Very Valid
	Average Score	**3.45**	Very Valid

The feasibility assessment by material experts includes three aspects, namely, the completeness of the content of the material, aspects of usefulness, and the suitability of practice questions. The average score of the material expert assessment can be seen in Table 3.

Table 3. Material expert assessment results

No.	Assessment Aspect	Score	Category
1	Completeness of material content	3.1	Valid
2	Benefit aspect	4	Very Valid
3	Suitability of practice questions	3.33	Very Valid
	Average Score	**3.47**	Very Valid

The feasibility assessment by media experts covers four aspects, namely the use of digital pocketbooks, pocket book cover design (cover), pocketbook content design, and ease of use of pocketbooks. The average score of the media expert assessment results can be seen in Table 4.

Table 4. Assessment results of media experts

No.	Assessment Aspect	Score	Category
1	Use of pocketbook	4	Very Valid
2	Pocketbook cover design	3.75	Very Valid
3	Pocketbook content design	3.92	Very Valid
4	Easy-to-use pocketbook	3.5	Very Valid
	Average Score	**3.88**	Very Valid

4.5 Initial Field Trial Results (Limited)

The limited trial was carried out after the inquiry-based digital pocketbook developed to improve students' scientific literacy was revised according to expert advice. The trial was conducted on five students and one teacher at Public Elementary School No. 1 Sugihan, Toroh District, Grobogan Regency. The feasibility assessment at this trial stage uses a response questionnaire.

The overall average of the results of the initial (limited) field trial showed a score of 3.08 with the "Good" criteria. However, there are still aspects of assessment that are lacking and need to be adjusted between the suitability of the questions and the material. This became the basis for revising an inquiry-based digital pocketbook after a limited trial.

Table 5. Recapitulation of student response questionnaire results according to Partono et al. (2019)

No.	Trial Type	Overall Average Score	Criteria
1	Initial Trial	3.14	Good
2	Extended Trial	3.42	Very good

4.6 Main Field Trial Results (Expanded)

An inquiry-based digital pocketbook was developed to improve scientific literacy, which was revised based on the results of a limited trial and then tested in the field.

The results of the main field trial (expanded trial) in the sixth grade at Public Elementary School No. 3 Pilangpayung, Public Elementary School No. 1 Sugihan, and Public Elementary School No. l Krangganharjo. The assessment of this trial was expanded using student and teacher response questionnaires. Respondents for filling out the questionnaire in this trial were the sixth-grade students of Public Elementary School No. 1 Sugihan and Public Elementary School No. 2 Krangganharjo, each with ten children and one teacher in the sixth grade of schools.

Table 6. Recapitulation of teacher response questionnaire results according to Partono et al. (2019)

No.	Trial Type	Overall Average Score	Criteria
1	Initial Trial	3.03	Good
2	Extended Trial	3.32	Very good

5. Conclusion and Recommendation

The average “Yes” answer to the student and teacher needs questionnaire was 89.00% and 90.00% proving that inquiry-based digital pocketbooks are needed by students and teachers to improve the scientific literacy skills of sixth-grade elementary school students in Toroh District. Assessment of the validator of linguistics, materials, and media experts shows the assessment results with the "Very Eligible" criteria. The results of filling out student and teacher response questionnaires also gave results with the criteria of "Good" and "Very Good.” This proves that inquiry-based digital pocketbooks are appropriate to be used to improve the scientific literacy skills of sixth-grade elementary school students in Toroh District. The inquiry-based digital pocketbook developed in this study effectively improves the scientific literacy skills of sixth-grade elementary school students in Toroh District. This is evident from the results of the paired t-test, which gives the result that there is a significant difference in students' scientific literacy skills before and after participating in learning using an inquiry-based digital pocketbook. The independent t-test (independent sample t-test) proves that there are differences in students' scientific literacy skills between those who take part in learning using digital pocketbooks and those who do not.

Media is needed in learning to stimulate students to actively participate in learning and be able to find concepts independently. The results of this study indicate that the inquiry-based digital pocket book that was developed is needed to improve the scientific literacy of sixth-grade elementary school students in Toroh District. This implies that teachers seek and develop learning media needed to improve learning outcomes following the learning objectives to be achieved and instill character education. The inquiry-based digital pocketbook developed in this study is suitable for use in students' scientific literacy skills. This implies that the product in this study is following the stage of Piaget's cognitive development of elementary school students, which is included in the concrete operational stage, where children like things that are concrete or real. The development of an inquiry-based digital pocketbook has shown effective results to improve the

scientific literacy skills of sixth-grade elementary school students in the Toroh District so that it can be implied as a reference for developing similar teaching materials but with different variables according to indicators of the basic competencies to be achieved, and not only in grade VI elementary school but at other grade levels.

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