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Development of An E-Pocket Book Using The Canva Application to Train Students Scientific Literacy Skills

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Abstract: This study aims to develop a *Canva*-based *e-pocket book* for enhancing science literacy skills among students. The Research and Development (R&D) method was employed, utilizing the ADDIE model. This study concentrates on developing science literacy skills in conjunction with Biology curriculum materials, particularly in the chapter concerning plant organs, which necessitates comprehension of scientific concepts and their practical application in daily life. The instruments consisted of validation questionnaires, science literacy tests, and interviews. Data analysis involved qualitative descriptive and quantitative statistical analysis. Results showed showed that the *e-pocket book* media was very feasible (89.7%) and effective in improving students' science literacy skills with the category of "moderate" (0.4) in the aspect of science context, "high" (0.8) in the aspect of science content and "high" (0.9) in the aspect of science competence. The *e-pocket book* created using the *Canva* application can be accessed by anyone even if they don't have the *Canva* application, and can be accessed via *smartphone*, computer and laptop. *E-pocket book* media can be an innovative learning alternative that effectively in addressing the contraints of educational facilities in schools, thereby potentially enchancing the quality of learning signicantly.

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Introduction

Scientific literacy skills are a prerequisite for students to learn to analyze problems and relate different scientific facts to each other. Scientific literacy refers to the knowledge, understanding, skills and values that exist in science (Huryah, *et al.,* 2017). People who have scientific literacy will find it easy to communicate scientifically about science and technology which requires the ability to design investigations, evaluate and explain phenomena scientifically, as well as interpret evidence and data (OECD, 2018). Based on research results from the Program for International Student Assessment, in 2018 the average science ability score in Indonesia was 396 and the score for countries listed in the OECD (Organization for Economic Co-operation and Development) was 487. Meanwhile in 2022 in Indonesia the average score science ability is 383, and the average score of several countries listed in the OECD is 485. Based on OECD standards, Indonesia is below international standards (Kemdikud, 2023).

The research results of Suparya., *et al.,* (2022) shows that the factors causing low scientific literacy are low reading ability, inadequate school facilities, poorly organized school management, non-contextual learning, and so on. The solutions provided include holding a school literacy movement, providing operational assistance funds, transforming school leadership, and increasing teacher competency. Efforts to increase scientific literacy in students are by using innovative learning media.

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The results of observations with the Baitul Arqom High School biology teacher show that the existing learning media is based on scientific literacy. However, the implementation of scientific literacy is still at the first indicator, namely scientific competence and has not used digital learning media. Existing learning still relies on textbooks and conventional *PowerPoint* presentations, so it does not arouse student interest and enthusiasm. Students' scientific literacy needs to be developed so they can reach a higher indicator stage. According to Dermawan & Fahmi, (2020) utilizing information and communication technology in the learning process as innovation in the world of education can help students achieve the learning goals desired by the teacher. The facts are that students are more interested in reading material that has little description and contains pictures and colors presented in the form of an *e-pocket book* (Astutik., *et al.*, 2018).

Research by Sulistri, *et al*., (2020) shows that an ethnoscience-based digital *pocket book* is feasible to implement with a level of material suitability of 93.75%, graphic suitability of 90.75%, and linguistic suitability of 94.25%. However, the study has limitations in terms of accessibility and focus of the material. To overcome these limitations, researchers developed *e-pocket book* media using the *canva* application to train class XI students' scientific literacy skills on plant organs, especially flower organs. The diversity of shapes, colors and aromas of flowers as a means of plant reproduction can be used to help students understand learning material. The focus on flower organ material in plants refers to the results of Laili's research. *et al.*, (2019) who stated that not all tobacco genera have flowers with the same trumpet size, number of generative branches and number of flowers. Because each plant genotype has a different response in response to environmental conditions (Al Habib, *et al*., 2022; Al Habib, *et al.*, 2024). The *e-pocket book* created has the added value that it can be accessed anywhere and at any time, provides a lot of information, is easy to use, and is presented with attractive colors and images. This *e-pocket book* was created using the *canva* application because it provides an attractive design, user creativity in utilizing various available features, saves time in designing, and design activities can be done using a laptop or device (Pelangi, 2020).

E-pocket book media can help train students' scientific literacy skills, especially in plant organ material which provides examples in everyday life. Muyaroah & Fajartia's (2017) research concluded that Android-based learning has a positive impact on improving student learning outcomes. The *e-pocket book* created using the *canva* application can be accessed by anyone even if they don't have the *canva* application, and can be accessed via smartphone, computer and laptop (Syahrir, *et al*., 2023). The *e-pocket book* media development provides flexible and interactive access through various devices, enhancing student motivation and learning interest. Additionally, utilizing the *Canva* application in media development offers ease and creativity in design and content creation, presenting an effective alternative for biology education.

Research Method

The research method used is Research and Development (R&D) which aims to produce products and test product feasibility. Research and Development (R&D) can be in the form of new products or developing existing products (Sugiyono, 2019). This research procedure uses a modified ADDIE model which can be seen in Figure 1 below,

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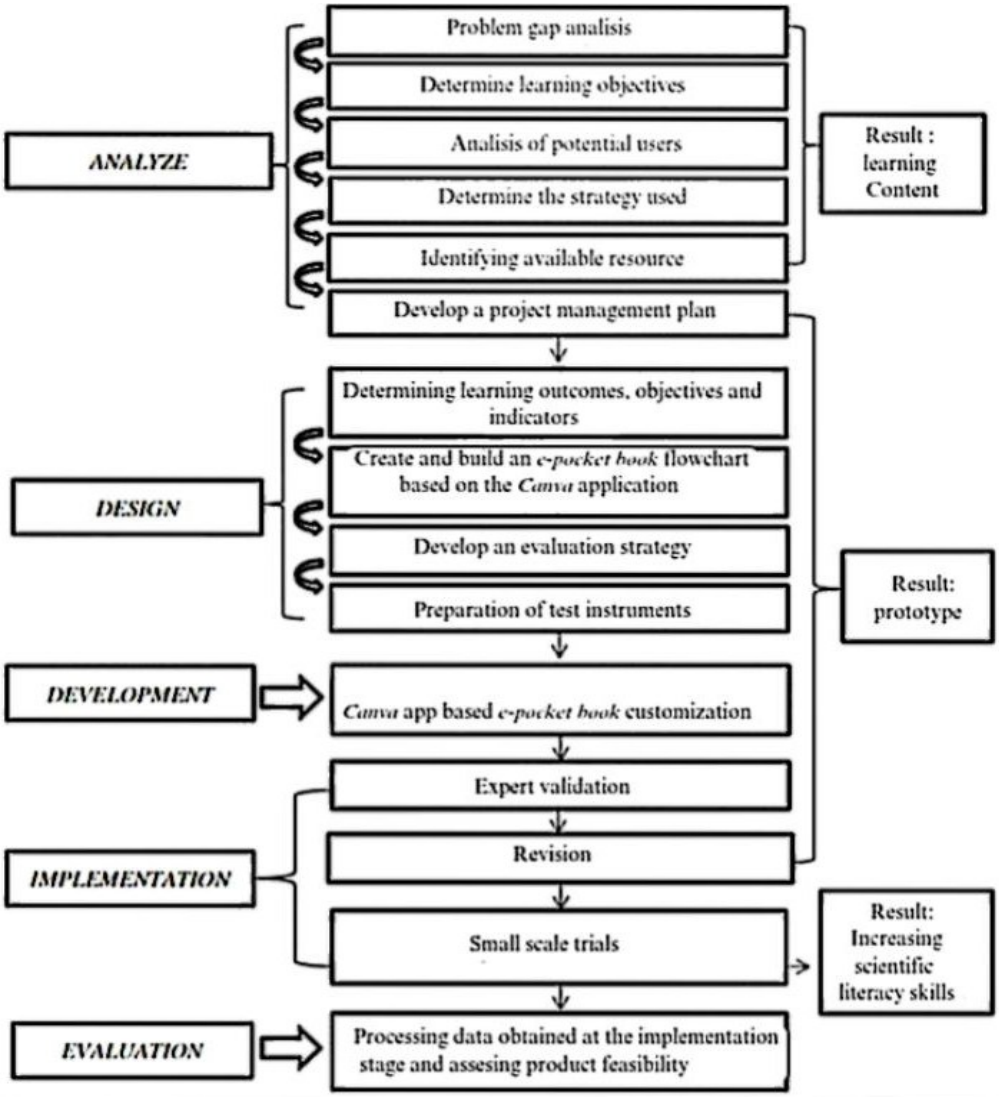

Figure 1. Modified ADDIE model development procedure.

The research subjects were 10 class XI students. Research on developing *e-pocket books* using the *canva* application to train students' scientific literacy skills on plant organ material at Baitul Arqom Senior High School (SMA). Data collection techniques in this research include interviews, validation questionnaires, and scientific literacy tests (pretest and posttest). The data obtained in the research was analyzed using two techniques, namely qualitative descriptive analysis and quantitative data analysis. The qualitative descriptive data is in the form of comments and suggestions from validators. Meanwhile, quantitative data consists of quantitative data from validation results and scientific literacy test results. Validation data is used to determine the feasibility of *e-pocket book* products using the *canva* application to train scientific literacy skills. Then the data obtained is analyzed and simplified into percentage form using the following formula (Riduwan, 2015).

$$P = \frac{S}{N} X\ 100\%$$

then averaged using the formula :

$$P = \frac{\sum P}{N}$$

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The results of the validation data calculations are converted into an assessment statement in table 1 below,

Table 1. Eligibility categories

Category	Score
Not feasible	0-20
Not worthy	21-40
Decent enough	41-60
Worthy	61-80
Very worthy	81-100

Source : (Riduwan, 2015)

The next quantitative data is data from the results of the scientific literacy ability test which was carried out before using the media (*pretest*) and after using the media (*posttest*). Then analyzed using the following Normal Gain (N-Gain) test,

$$\text{N-Gain} = \frac{skor\ posttest - skor\ pretest}{skor\ ideal - skor\ pretest}$$

The results of obtaining scores based on the N-Gain calculation are categorized as in table 2, Below,

Table 2. Category of increasing scientific literacy based on N-Gain score

N-Gain	Category
G > 0,7	Tall
0,3 < G ≤0,7	Currently
G ≤ 0,3	Low

Source: Hake (in Handayani, *et al*., 2023)

Results and Discussion

Analyze

The Analyze stage consists of several stages, namely 1) Problem gap analysis to find out the problems that occur through the results of observations (interviews). The conclusion of the interview with the Biology teacher at Baitul Arqom High School is that the learning media used is based on scientific literacy. However, the implementation is still at the initial stage (science competency) and does not yet use digital learning media. 2) Determine learning objectives in accordance with the applicable curriculum. 3) Analysis of potential users that is aligned between the material used by the researcher and the grade level that takes the material. 4) Determine the strategy that will be used, namely in the form of *problem based learning* (PBL) with the aim of strengthening the product content and scientific literacy results that will be measured. 5) Identify the resources available at the school in the form of employment, school facilities, learning content, technology used. 6) Develop a project management plan by grouping each research procedure based on the development model carried out. Branch, 2009 (in Hidayat, 2021) states that the ADDIE model is not appropriate if it is based on a lack of knowledge and skills, so other teaching options must be proposed. In this research, the analysis results obtained were not caused by the things mentioned by Branch. This research was developed based on the conclusions from the results of observations as described in the initial stage.

Design

The Design stage consists of several more stages, including: 1) Determining learning outcomes, objectives and indicators, the aim of which is to adapt the learning objectives (TP), learning outcomes (CP) and learning indicators known at the analysis stage to the material used. 2) Create and build an *e-pocket book* flowchart based on the *canva* application with the

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aim of making it easier at the next stage. 3) Develop an assessment strategy including expert assessment regarding media and assessing students' scientific literacy abilities through the test questions given. 4) Preparation of test instruments which include scientific literacy test questions, totaling 15 questions (10 multiple choice questions and 5 description questions) which are made with reference to scientific literacy indicators. The design stage in the ADDIE model sets clear directions and goals for the instructive development process. According to Branch, 2009 (in Hidayat, 2021), this stage ensures alignment between needs, goals, strategies and assessments during the ADDIE process, thereby strengthening learning effectiveness.

Development

The Development stage in the ADDIE model has the aim of developing, validating and preparing effective learning resources. Teachers must identify needed resources, develop learning tools, and evaluate previous learning outcomes. This ensures the successful implementation of the teaching that has been planned in the next stage of the ADDIE model Branch, 2009 (in Hidayat 2021). At the development stage, we made adjustments to the *e-pocket book* based on the *canva* application. At this stage, the flowchart that was created previously is inserted into the template in the *canva* application.

Implementation

The implementation stage includes the media validation stage with 4 validators (material experts, linguists, media experts and practitioners), then revising the product according to the validator's comments and suggestions. Some validator comments and suggestions are presented in table 3 below,

Table 3. Comments and suggestions from validators

Validator	Comments and suggestions
Media expert	On the author and class covers the letters are too small.
Material expert	Expansion and depth of material.
Linguist	Correct some non-standard words
Practitioner	Expanding the material and increasing the number of multiple choice questions.

The media appearance before and after revision is in Figure 2 below,

a)

Before the revision, the size of the writing in the identity section and the level of the book user were smaller.

a)

After being revised, the size of the writing in the identity section and the level of book users are larger.

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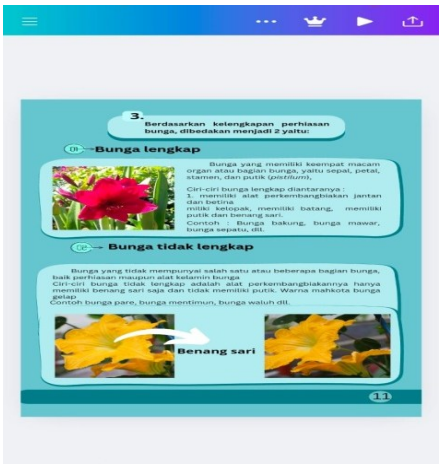

b)
Before being revised, the material listed was still inaccurate.

b)
After revision, the material listed is correct.

c)
Before the revision, the answer choices in multiple-choice questions were only in the form of A, B, C, D

c)
After the revision of the answer choices in the multiple-choice questions to A,B,C,D,E

Figure 2. *E-pocket book*, a) cover b) content of material c) exercises

Validation is carried out again after making revisions to find out the results of the assessment score and feasibility percentage. The final stage of implementation is a small-scale trial on 10 students at the same time to measure students' scientific literacy skills. The students used were selected directly by the biology teacher.

Evaluation

The final stage in the ADDIE development model is evaluation. This stage is carried out by processing the data obtained at the implementation stage and assessing the feasibility of the product. The results of the expert validator assessment regarding *e-pocket book* media are presented in table 4 below,

Table 4. Recapitulation of assessment results from media validators

Validator	Average score (%)	Category
Media expert	74	Worthy
Linguist	100	Very worthy
Material expert	89	Very worthy

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Practitioner	96	Very worthy
Total score	**359**	
Average	**89,7**	Very worthy

Based on table 4, it shows that the average percentage of product feasibility validation results is 89.7% according to the feasibility category, including the very feasible criteria. This means that the product in the form of an e-pocket book using the *canva* application developed can be implemented in learning. Mujahidin, et al (2019) stated that product validation is carried out by providing an assessment based on rational thinking, then making improvements or revisions before being tested or implemented.

The use of *e-pocket books* can be an appropriate alternative to strengthen understanding of the concept of quadratic equations, as evidenced by the increase in the number of students who achieve good and sufficient understanding of the concept (Saputri, *et al*., 2024). The difference between Saputri's research and this research is the focus of the material and the basis used. The *e-pocket book* uses the *canva* application to train students' scientific literacy skills. This plant organ material is very suitable for application in biology learning. The *e-pocket book* is equipped with practice questions based on scientific literacy indicators and uses *problem based learning* (PBL) strategies. Wina S, 2006 (in Lamalelang, 2017) states that the *problem based learning* strategy provides students with the opportunity to connect knowledge with real practice. According to Herawati, *et al.,* (2020), digital *pocket book* media is effective for application in learning because the results of their research show student responses at a percentage of 3.49 on a small scale and 3.64 on a large scale, which both have very interesting criteria. *E-pocket book* media can be used by teachers and students because it makes it easy for users. The *e-pocket book* media developed using the *canva* application provides a few descriptions, lots of pictures and colors, includes videos, and can be accessed via various digital tools such as smartphones, laptops and PCs. Apart from that, this *e-pocket book* can be accessed anywhere and at any time and does not require a large amount of storage space (Syahrir, *et al*. 2023).

The media validation results were declared very feasible, then the *e-pocket book* media was used to measure the level of students' scientific literacy abilities. To determine whether there was an improvement or not, the researcher conducted a pretest and posttest. Muhibbin, 2012 (in Siregar, *et al*., 2023) states that the purpose of holding a pretest (initial evaluation) is to identify students' level of knowledge before providing the material to be presented. The purpose of the posttest or (final evaluation) is to determine the level of knowledge after obtaining the learning materials presented. The following are the average results of calculating scientific literacy abilities in small-scale trials.

Table 5. Results of recapitulation of average scientific literacy abilities

Question criteria are based on scientific literacy indicators	***Pretest***	***Postest***	**N-Gain**
5 questions with aspects of science competency	2,0	4,7	0,9
5 questions with aspects of science content	2,4	4,5	0,8
5 questions with aspects of the science context	2,0	3,2	0,4

Based on table 5, it can be concluded that there has been an increase in scientific literacy skills in the "medium" category for questions created according to the level of indicators in the scientific context aspect. Scientific literacy abilities in the "high" category are found in questions created according to the level of indicators in aspects of scientific competence and scientific content. Scientific literacy can be measured based on several indicators issued by decisions according to PISA, 2018 which include 3 aspects, namely 1. Scientific competence

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(explaining scientific phenomena, using scientific evidence, and identifying scientific questions). 2. Science content (understanding phenomena). 3. Science context (solving problems).

Research by Ramdani, *et al.,* (2020) shows that Android-based learning media during the Covid-19 pandemic can increase scientific literacy with an average scientific literacy instrument of 83%. Utami, A.H.S *et al*., (2022) stated that the average percentage result was 51.09% or relatively low and the learning resources used were only worksheets and textbooks. The results of this research are the same as the results of research by Hasasiyah, S.H, *et al.,* (2020) which obtained relatively low improvement results. The findings in this research are that using *e-pocket book* media using the *canva* application on plant organ material can improve scientific literacy skills and make the material easy to understand. With an average validation result of 89.7% or very decent and an increase in scientific literacy skills in the medium and high categories. So it can be concluded that innovation in learning media influences students' scientific literacy abilities. The results of this research are in line with the statement by Suparya, *et al.,* (2022) regarding the factors and solutions that cause scientific literacy. The existence of *e-pocket book* media can be an alternative to continue to provide innovative learning with limited school facilities.

The utilization of *e-pocket book* media can be a viable strategy for enhancing students' science literacy. This finding aligns with learning theory, which highlights the significance of incorporating interactive and innovative media into the learning process. The results of this study can be applied to develop more effective and efficient learning media, providing a valuable resource for teachers and curriculum developers to design innovative and interactive learning experiences. Additionally, this study's findings can inspire further research into the development of more advanced and effective learning media.

Conclusion

Based on the research results, it can be concluded that: 1) *E-pocket book* media using the *canva* application is very feasible to implement with an average percentage of 89.7%. 2) *E-pocket book* media can improve scientific literacy skills with an average N-Gain of 0.4 or medium in the science context aspect, 0.8 or high in the science content aspect, and 0.9 or high in the science competency aspect. Comments and suggestions from validators are used to correct media deficiencies. Through *e-pocket book* media with the *canva* application, you can overcome limited school facilities and other obstacles in learning.

Recommendation

Recommendations for educators based on this study's findings include enhancing student science literacy by incorporating more comprehensive and in-depth learning materials. Additionally, educators can leverage educational technology to integrate *e-pocket book* media into the learning process, ultimately improving student learning outcomes.

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