



The Development Environmental Literacy Media Learning for Elementary School Student

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Abstract: Developing environmental literacy is a significant challenge for Indonesian education. A solid environmental caring character embedded in students can occur due to the success of environmental literacy education, so it is expected that students have a good understanding of the environment. The research aims to produce android-based mobile learning media about environmental literacy in elementary school thematic learning and test the feasibility of android-based mobile learning media developed. This research using research and development (R&D) methods, has stages: 1) Analyze, 2) Design, 3) Development, 4) Implementation, 5) Evaluation. Research place in SD Negeri 2 Pagedangan. Research data is processed using instruments. Data analysis techniques are carried out in a quantitative descriptive way. Media eligibility is based on material and media experts' assessments. The results showed that the resulting android-based mobile learning media was worth using with an average score of 3.42 with an "Excellent" criterion for the assessment of mobile learning media in terms of material, and an average score of 3.67 with the criteria "Excellent" for mobile learning media assessment in terms of media. In addition, the average score of student response after using the media is at excellent level.

Keywords: mobile learning, android, literature environmental

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INTRODUCTION

Education is one of the factors that can be used as a benchmark for the progress and achievement of a nation's achievements. Education is not just conveying knowledge but a real manifestation for students (Riono & Fauzi, 2022). Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious-spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation and state. Education plays a role in protecting the environment, environmental education through education is shown by the collaboration between the State Ministry of the Environment in 2006 launched the Adiwiyata Program and the development of environmental education programs at the primary and secondary education levels was developed in 2016 through the Adiwiyata program (Rezkiti & Wardani, 2018). Through this adiwiyata program, education in Indonesia pays more attention to providing understanding related to environmental care or environmental literacy.

In the era of the industrial revolution 4.0 today, individual literacy is critical to master because it can form the resilience and competitiveness of the nation globally. Literacy is concerned with improving an individual's ability to understand information critically, creatively, and reflectively through reading, thinking, and writing (Antoro, 2017; Yunianika & Suratinah, 2021; Afni & Suyono, 2022). Providing knowledge and insight to students is very important. Equipping humans with the importance of environmental literacy is one way that the principle of sustainability in environmental management can be implemented (Bissinger & Bogner, 2018; Kusumaningrum, 2018). Environmental literacy is a conscious attitude to keep the environment in balance. Environmental literacy should be instilled in children from an early age. Improving environmental literacy means preparing humans who understand and can solve environmental problems then as environmental agents who can maintain environmental behavior (Wilujeng et al, 2019; Kamil et al, 2020). Because this environmental literacy takes a long time to be owned by someone. After all, it concerns a matter of habit. Habits cannot be applied instantly. Habits require a long and lengthy process. Environmental literacy consists of four parts: learners' knowledge of the environment, cognitive skills of learners, attitudes and behavior of learners towards the environment (Ardoin et al., 2020; Pratama et al., 2020; Panjaitan et al., 2021; Yadav et al., 2022). From some of the above opinions, environmental literacy is an individual's conscious effort on the surrounding environment and to solve environmental problems.

Environmental literacy in elementary school is certainly something that needs to be instilled from now on, considering and also considering that students who sit in elementary school will become the next

generation in maintaining the natural environment as a source of human survival. Knowledge and understanding, environmental awareness until finally realized in the form of action is a marker that learners have environmental literacy (Wolferberger et al., 2004; Kubiakto, 2014; Kaya & Elster, 2018; Orbanic & Kovač, 2021). Indicators of environmental literacy used in this study are limited to the components of environmental knowledge (knowledge of the environment) and cognitive skills (Goulgouti et al., 2019; Szcztyko et al., 2020). The development of environmental literacy capabilities can be done both integrated and separately in learning in the classroom. These ideal conditions turned out not to be following the actual conditions in the field that showed the self-awareness of Indonesian people in caring for the environment is still low. In line with the results of interviews with teachers and students of class V of Pagedangan State Elementary School in Purbalingga Regency, this condition showed that students' environmental literacy skills were still low. The problem arises because of the lack of understanding to maintain the environment because there is no availability of fun learning media and can facilitate students in developing environmental literacy knowledge.

One of the media that can be used in learning that can support environmental literacy skills is android-based. The base of the android operating system is the linux kernel which is open source, so the android operating system allows developers to always create their own android applications that can be used for a wide variety of mobile tools. Applications for learning sunda script can be implemented on android. Android-assisted learning can improve students' abilities or skills (Fatma & Partana, 2019). Android-based media development is based on integrating conservation principles. So as tge present learning media in the form of digital educational skills that can stimulate environmental literacy skills, because it is packaged in the form of games to create a fun learning environment. Fun learning will positively impact learning outcomes in both the cognitive, affective, and psychomotor realms. Based on the description above, there is a media need that can improve the literacy skills of class V students.

The results of interviews with teachers and students of class V state elementary school in Purbalingga Regency showed that environmental literacy skills are still low. The problem is due to the unavailability of media to improve environmental literacy skills for students. One alternative learning media that can be used as an alternative solution is android-based learning media. This learning media developed through android is a technology-based learning media in the form of games on smartphones with audio-visual elements that can stimulate the literacy skills of the student environment. So this research is essential because there is a need for media to improve environmental literacy for students of class V elementary school that is interesting and fun. Hence, it needs the development of android-based learning media. This research aims to produce learning media to improve environmental literacy skills.

METHODS

Type of Research

The type of research used in this research is research and development or Research and Development (R&D) with the ADDIE development model (Analyze, Design, Develop, Implement, & Evaluate). (Branch, 2009) argues that ADDIE is a product development concept that conforms to a student-centered, innovative, authentic, and inspiring educational philosophy. This research aims to analyze needs development.

Participants

This development research conducted at SD Negeri 2 Pagedangan with class V as research subjects with 22 students.

Procedures

Five stages of development are used in research, as illustrated in:

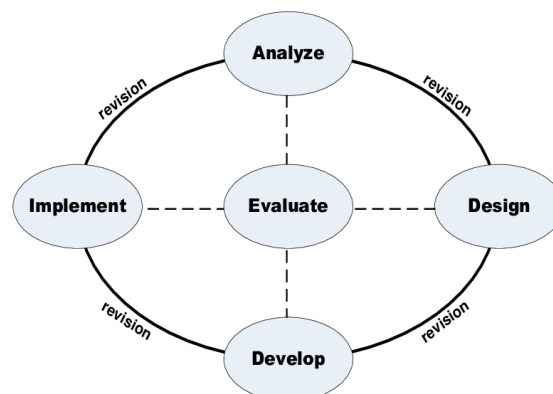


Figure 1. Model ADDIE (Branch, 2009)

The first step is an analysis that includes an analysis of the need to identify existing problems that occur in class V IPA learning. After that, researchers conduct literature studies to find solutions to the problem. After that, interviews and questionnaires are distributed to classroom teachers and students to identify the required learning media. The second step is the analysis of needs (analyze); this stage is done to know the needs of teachers and students for the development of media that will be done. Data from the analysis of needs is then used to develop learning media. Need assessment through two activities: covering the dissemination of questionnaires to teachers and students and interview activities to teachers and students. At this stage, there is also an analysis of themes, sub-themes, essential competencies, indicators, learning objectives, and appropriate teaching materials to develop environmental literacy skills.

The third step is designing media (design), including designing scenarios or learning activities that follow the syllabus in elementary school, designing flowchart design, storyboards and materials to be developed, and naming this media with "Water Learning Literacy." Moreover, there are also conducted for determination of data collection techniques, research intrusions, and FGD with teachers, media experts, and material experts. The selected material is in class V Theme 8 of Our Friends Environment. The fourth stage is the development of media (develop). At this stage, researchers conduct activities to prepare water literacy learning media that will be used by considering the theme or template used for images and answer choices. Teaching materials are displayed audio-visually, making them more exciting and accessible for students to understand learning.

The fifth step is implementation. At this stage, the learning media Water Learning Literacy is piloted by using it in the learning process in the classroom. Done twice; Limited-scale trials and large-scale trials. Students and teachers responded to the use of such learning media. If their responses are correct, then large-scale trials can be conducted. Data on the development of environmental literacy is obtained from questionnaires filled before and after learning using environmental literacy learning media. The last step is an evaluation to determine if the product development has been fit for purpose. If it does not achieve the expected goal, then the cycle at the previous stage can be repeated. At this evaluation stage, researchers analyze the development of environmental literacy before and after using water literacy learning media. In addition, the improvements made are based on responses from teachers and students. Evaluation of the learning media development process is also carried out entirely.

Data Collection Instruments

The data in this study consists of validation results conducted by material and media experts regarding the feasibility of refined products, responses to the use of water literacy learning media as a learning medium shared with students and teachers, and questionnaires about student character discipline and hard work. The data collection instrument used in the study was a questionnaire using the Likert scale. The data obtained is quantified and used to determine the quality of IPS learning media, including the product's feasibility and effectiveness.

Data Analysis

The data analysis technique in this study is carried out qualitatively and quantitatively. Qualitative analysis is used to describe the process of product development until it is obtained in the form of learning media that deserve to be tested extensively in real learning in school. Quality data is obtained from comments and suggestions by media experts, material experts, teachers, and students. Meanwhile, quantitative data analysis is used to describe product quality assessment based on the developed media's level of validity and influence. The data used in quantitative analysis is obtained from the validation results of learning media by material experts and media experts. The results of the media assessment questionnaire were analyzed using the Ideal Raw Deviation (S_{Bi}). Here are the data analysis techniques using S_{Bi}.

Table 1. Four Scale Assessment Criteria

Score Interval	Criteria
$M_i + 3,0 S_{Bi} \geq x \geq M_i + 1,5 S_{Bi}$	Excellent
$M_i + 1,5 S_{Bi} > x \geq M_i$	Good
$M_i > x \geq M_i - 1,5 S_{Bi}$	Bad
$M_i - 1,5 S_{Bi} > x = M_i - 3,0 S_{Bi}$	Very Bad

Table 2. Four Scale Assessment Category Conversion

Score Interval	Criteria
$4,00 \geq x \geq 3,25$	Excellent
$3,25 > x \geq 2,5i$	Good
$2,5 > x \geq 1,75$	Bad
$1 > x \geq 1,75$	Very Bad

RESULT AND DISCUSSION

Need analysis is done in schools through interviews with teachers and questionnaires to students and teachers. The interviews with teachers explained that learning media are needed to improve environmental literacy. The learning medium must contain material, material implementation on questions of real-life problems. The presentation of learning media must also use illustrations in the form of images. The language used in this learning medium is a colloquial language that students easily understand. The implementation of android-based mobile learning media development about elementary school environmental literacy can be spelled out as follows:

The Analysis stage at this stage is carried out an analysis of the need for the development of new media based on the correct problems, solutions, and products. The analysis is carried out on various matters related to the design and development of learning media products. The analysis is done in the form of needs analysis, supporting factor analysis, and curriculum analysis. The Design stage includes the determination of media forms, the determination of media formats, and the planning of early media. Furthermore, referring to the results of the analysis stage, initial media design is carried out with the determination of media shapes and formats, the creation of media design (storyboard), and the creation of flowchart diagrams.

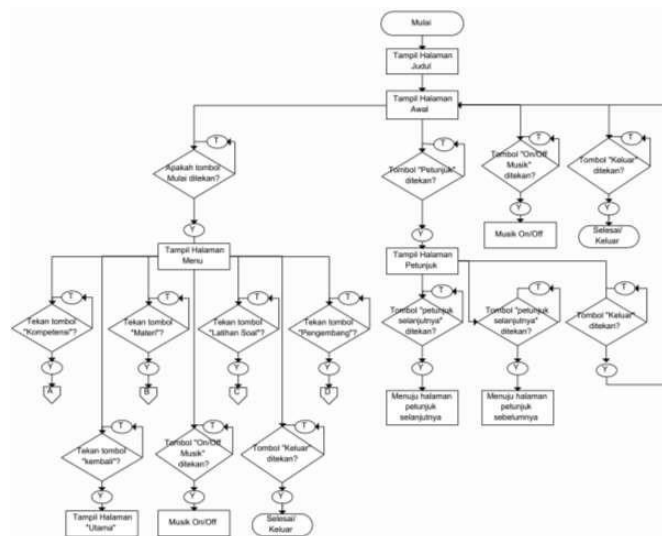


Figure 2. Interactive Multimedia Flowchart

The media creation development phase is based on material, storyboard, flowchart, and content in mobile learning media. After the media is formed, validation is carried out by material experts and media experts. The validation process is done to get criticism and suggestions from the media that have been made. Criticism and suggestions from validators are used to revise mobile learning media made. After the media is revised, validation is validated until it is declared worthy of being piloted in learning activities.



Figure 3. Initial View

Media Expert Validation

Validation is done by filling in a mobile learning media validation questionnaire that includes visual communication and software aspects. Based on the analysis results using the Ideal Standard Deviation (SBI) from the assessment points of each aspect, the learning media developed obtained an average score of 3.42 with excellent criteria. Assessments by media experts are shown in the following table:

Table 3. The Results of Media Eligibility Analysis

Aspect of Assessments	Score	Criteria
Aspects of Visual Communication	3,47	Excellent
Software Aspects	3,36	Excellent
Average	3,42	Excellent

Based on the results of the analysis from media experts regarding this Android-based interactive multimedia that was developed, it produced an average value of 3.42 with very good criteria. Things that are assessed include appearance, color selection, button functions, output from menus, as well as ease of access to program processing and application use. The suggestion from the validator is that this application is good, but the layout needs more attention

Validation of Material Experts

Assessment is carried out by filling out a mobile learning media validation questionnaire that covers material aspects and learning design aspects. Based on the analysis results using the Ideal Standard Deviation (S_{Bi}) from the assessment points of each aspect, the learning media developed obtained an average score of 3.67 with excellent criteria. Assessments by media experts are shown in the following table.

Table 4. The Results of Material Feasibility Analysis

Aspects assessed	Skor	Kriteria
Material Aspects	3,70	Excellent
Learning Design Aspects	3,63	Excellent
Average	3,67	Excellent

The results of the material expert validation carried out obtained an average value of 3.67 with good criteria. The aspects assessed by the material experts are language, the suitability of indicators with the material, the suitability of animation with the material to be conveyed, illustration aspects, and evaluation questions. At the implementation stage, learning media that have been said to be feasible by material experts and media experts are then conducted trials using one-on-one trials. The trial was conducted one-on-one with respondents to 22 students of grade 5A SD N 2 Pagedangan. The trial was conducted between March 30 and April 4, 2020. The implementation of the trial by way of students downloading mobile learning media through the link that has been prepared then installing the application on their respective android smartphone devices. After using or running the developed mobile learning media, each student fills out an online questionnaire in a media usage response questionnaire. Based on the analysis results using The Ideal Standard Deviation (S_{Bi}) from the assessment points, the learning media developed obtained an average score of 3.58 with excellent criteria. The results of the analysis learners' response to each aspect of the assessment can be seen in the following table.

Table 5. Results of Student Response Analysis

Aspect assessed	Score	Criteria
Media Aspect	3,7	Excellent
Learning Design Aspects	3,4	Excellent
Aspects of Visual Communication	3,9	Excellent
Programming Aspects	3,7	Excellent
Total Average	3,58	Excellent

The evaluation stage is when researchers analyze errors that occur during the study and revise the final stage on mobile learning media products developed. The final stage revisions made are improvements to some incorrect authorship. The product developed in the research is in the form of interactive multimedia for mobile learning in the form of an application on a smartphone device based on the Android operating system with the name "Water Learning Literacy". The material in this interactive multimedia has 8 sub-themes, 1 human and the environment. This interactive multimedia development uses the ADDIE model. The ADDIE model provides an opportunity to evaluate development activities at each stage (Tegeh et al., 2014). With an evaluation at every step of the development of environmental literacy media, it is certainly able to minimize the level of errors and shortcomings of the product being developed.

In the first analysis stage, the curriculum analysis was carried out. Curriculum analysis is carried out to see the curriculum used by the school and then identify competency standards and basic competencies through the syllabus. This is done to adjust the material and learning objectives based on the competencies required of students. the first activity at the analysis stage is to analyze the competencies required of students (Tegeh et al., 2014). Conduct competency analysis so that the products developed can assist students in achieving learning objectives. After analyzing the curriculum, an analysis of student characteristics will then be carried out, this is of course to find out how the characteristics of students learn in the classroom, so that the

media developed is in accordance with the characteristics of these students. The characteristics of elementary school students who are generally between the ages of 7-11 years are starting to have a high curiosity by investigating, trying, and experimenting about something that is considered interesting for them. Cognitive development of elementary school age students between 7-11 years is still at the concrete operational stage (Susanto, 2013). So, students will be more active if they use concrete media in learning. Furthermore, the last analyzed is the media. Media analysis was carried out to find out the existing media and find out the media used by the previous teacher. This is done to adjust the needs of students in learning with the developed media.

At the design stage, the steps are (1) determining KI, KD, indicators, and learning objectives (2) determining the software used (3) making flowcharts, making storyboards (4) collecting materials that will be included in interactive multimedia. Product design must be realized in the form of drawings or diagrams as a guide for evaluation and production (Sugiyono, 2014). The product design must be accompanied by an explanation of the materials used to make each component of the product, their sizes and tolerances, the tools used to do them, and the working procedures.

After completing the design stage, the next step is product development. In the stage of developing a framework that is still conceptual, it is realized as a product ready to be implemented (Mulyatiningsih, 2014). So, the existing designs at the design stage are developed into real products in the form of interactive multimedia that are ready to be implemented. Before being implemented, the developed media needs to be validated first by the validator. Validation is carried out using two validators, namely the media expert validator and the material expert validator.

At the implementation stage, the media trial that has been developed and declared valid by the validator is carried out. The evaluation stage carried out is evaluating each development stage that has been carried out starting from the analysis stage to the implementation stage. The evaluation stage carried out is to collect data at each stage that is used to perfect the developed media which is called formative evaluation. While the summative evaluation is carried out at the end of the stage after the media is repaired to determine its effect on the quality of the learning carried out (Susilana & Riyana, 2017).

Products developed in mobile learning media in the form of applications on smartphone devices based on the Android operating system with the name "Water Learning Literacy." After going through the stages in media, development obtained data on the feasibility of media products developed and the effectiveness of media to improve the level of environmental literacy in thematic learning of elementary school students. The feasibility of the mobile learning media product "Water Learning Literacy" is measured based on data obtained during the research process. The data in question is the assessment of media product validation by material experts and media experts and student responses to media products.

Media assessments from media experts are reviewed from aspects of visual communication and programming aspects. Based on media expert lecturers' assessment, an average media eligibility scores of 3.42. Based on the SBI criteria in Table 3, developed mobile learning media is included in the excellent criteria. This shows that the developed mobile learning media is worth using in learning. Learning media is said to be valid if it meets the requirements. First, in general the validator will state "good" or "very good" on the components of the learning media and in accordance with the learning indicators (Semadiartha, 2012).

In this research, material experts are from lecturers and classroom teachers. Media assessment of material experts is reviewed from material aspects and learning design aspects. Based on the material assessment, experts obtained an average media eligibility value of 3.67. Based on the SBI criteria in Table 4, mobile learning media developed is included in the excellent criteria. This shows that the developed mobile learning media is worth using in learning. One of the benefits of learning media is to facilitate interaction between students and teachers so that students more easily understand the subject matter and learning objectives can also be achieved (Muhson, 2010). The feasibility of mobile learning media based on student responses is reviewed from material aspects, learning design, visual communication, and programming. Student response data are obtained during field trials by filling out student response questionnaires. At the field trial stage with 22 students, the average media eligibility score was obtained at 3.58. Based on the SBI criteria in Table 5, developed mobile learning media falls into the Excellent Category. Therefore it can be said that the developed mobile learning media is worth using in learning.

The development of android-based mobile learning media with the name "Water Learning Literacy" is based on the problem of not maximal use of media in the thematic learning process charged with IPA, plus a low level of student environmental literacy. There are various media alternatives developed in the era of science and technology development as it is today. Mobile learning media developed is one of the multimedia-shaped media. The use of android applications on students can change learning to be more effective and can improve student learning outcomes (Sri & Wiwik, 2018). Furthermore, the results of this study are also in line with previous research that states that android-based learning media developed can improve environmental literacy (Rahayu, 2017; Nurseto, 2019; Eli & Fajari, 2020).

CONCLUSION

This research aims to improve the literacy of elementary school environments by developing learning media so that students appreciate the surrounding environment more. Based on the results and discussions, it can be concluded that the learning media "Water Learning Literacy" has been successfully developed and follows the needs of students and teachers. Based on material and media validation results, this learning medium is very feasible to use in IPA learning in elementary schools.

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