

Original Research Article

MOBILE LEARNING BASED ELECTRONIC WORKSHEET TO INTRODUCE THE WETLAND ENVIRONMENT TO EARLY CHILDREN

ABSTRACT

The rapid advancement of science and technology has an impact on human activities, the majority of which are governed by technology-based media. However, traditional learning media continue to dominate learning in early childhood education. This makes learning less interesting and monotonous. As a result, researchers are interested in developing a valid and effective electronic worksheet based on Mobile Learning on Introducing Wetland Environments using the **analysis, design, development, implementation, evaluation** (ADDIE) research and development (R&D) model. Data was gathered using techniques such as interviews, questionnaires, observation, and documentation. This study's data analysis techniques included quantitative and qualitative analysis. Based on the results of the initial product test, mobile learning-based electronic worksheet products were declared **valid and effective**. This electronic worksheet product can be used by teachers as an Android-based learning media to support interactive and interesting learning activities in **early childhood education**.

Keywords: Electronic Worksheet, Early Childhood Education

1. INTRODUCTION

The rapid advancement of science and technology has an effect on how the times are changing in the 21st century. This shift affects every aspect of human life, including education. Every educational institution is expected to adjust to these changes in order to keep learning interesting and relevant. Since the Covid-19 Pandemic occurred in 2020, the role of science and technology in education has been critical. Following the Indonesian government's policy of physical separation to prevent the spread of Covid-19, traditional face-to-face learning activities were replaced with media learning that incorporated technological sophistication. Learning media is required to make learning interesting and enjoyable. Furthermore, the media makes use of technology that children enjoy. Technology-based media used in learning activities can help students visualize material and increase motivation (Purnawati et al., 2020). As a result, teachers must be able to think creatively and innovate in order to use the appropriate technology-based media to stimulate early childhood growth and development (Diantari & Tirtayani, 2020). The media criteria used in learning must be visually appealing and interactive for students (Mustaqim, 2017). Furthermore, the use of technology-based learning media in learning must consider several factors, including: 1) the child's age level so that children can easily understand the material provided, 2) the need for assistance for children in using digital technology-based media, and 3) conducting periodic evaluations on the various features available in technology-based learning media (Putu et al., 2022) (Iskandar et al., 2022) (Ronimus et al., 2014).

Based on observations and interviews with teachers at Pertiwi Berangas Timur Kindergarten in Alalak, Barito Kuala, it was discovered that traditional learning media were still used in the implementation of learning. The use of worksheets dominated the media used. The worksheet was obtained from a publisher in the form of a book. The book did not yet include information about the child's environment, which is identical to the wetland environment. Furthermore, the teacher's worksheets were unappealing because they contained colorless images. Researchers are interested in developing worksheets that use technology as a result of this problem. **Electronic worksheet** is one type of learning media that teachers can create to help with material delivery. Teachers can compile, design, and create **Electronic worksheet** based on the needs of the unit. (Noprinda & Soleh, 2019) Worksheets, according to ABC, are student guides for conducting investigative and problem-solving activities. Various Electronic worksheet innovations, such as electronic

worksheets, are rapidly emerging in response to technological advancements. The electronic worksheet developed in this study is based on mobile learning. O'Malley's IN (Rahmat et al., 2019) mentions that android-based mobile learning as a learning medium is a learning that does not stay in one place or learning activities that occur when learning utilizes mobile technology devices. Mobile learning is intended as a complement to existing learning and makes it easy for children to be able to access learning anywhere and anytime. Atlewell (2005) revealed that mobile learning has several advantages: 1) helping students improve their abilities, 2) strengthening individual or collaborative learning, 3) helping students identify areas where students need guidance and support, 4) helping bridge the distance between hardware mobile phones such as cell phones and information and communication technology, 5) assisting students in conducting learning and managing their level of interest in learning activities, 6) helping students stay focused for long periods, 7) helping to increase self-appreciation in students, 8) helping increase self-confidence in students. This electronic worksheet discusses environmental material on wetlands that are suitable for the environment around the child. This is intended so that children can introduce the environment where they live, namely wetlands.

This study is expected to produce interesting and enjoyable learning media in the form of mobile learning-based electronic worksheets on the introduction of the wetland environment, in accordance with the needs and characteristics of early childhood. Children can use this media to learn about and understand the wetland environment, which is the closest environment to those who live on the river's banks.

2. METHODOLOGY

This type of R&D created a learning medium in the form of a mobile learning-based electronic worksheet on the introduction of the wetland environment. The ADDIE model was used for research and development (R&D), which consists of five stages: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation. Several data collection techniques were used in this study, including interviews, questionnaires, observation, and documentation. In the needs analysis stage, interview and documentation techniques were used to gather preliminary information. The questionnaire was used during the development stage for expert product evaluation. Observations were used during the product testing stage of implementation. Table 1 shows how quantitative data analysis techniques are used to analyze the results of assessment questionnaires administered by media experts, material experts, and practitioners in the feasibility assessment category.

Table 1 Benchmark Reference Assessment Category (PAP)

Average Answer Score	Average Skor	Category
$X > \bar{x} + 1,80 \times S_{bi}$	> 4,2	Very Good
$\bar{x} + 0,60 \times S_{bi} < X \leq \bar{x} + 0,60 \times S_{bi}$	>3,42 – 4,2	Good
$\bar{x} - 0,60 \times S_{bi} < X \leq \bar{x} + 0,60 \times S_{bi}$	>2,6 – 3,4	Fair
$\bar{x} - 1,80 < X \leq \bar{x} - 0,60 \times S_{bi}$	>1,8 – 2,6	Poor
$X \leq \bar{x} - 1,80 \times S_{bi}$	$\leq 1,8$	Very Poor

(Sudjana, 2009, p. 122)

Table 2. Category Interpretation of N-Gain Effectiveness

Percentage	Interpretation
<40	Not effective
40-55	Less effective
56-75	Fairly effective
>76	Very effective

Table 2 contains data analysis on the observation sheet used in field trials to determine effectiveness using the effectiveness assessment category. Qualitative data in the form of suggestions and input obtained from initial product

trials, as well as descriptive field trials, will be used to improve the product. The developed product takes the form of mobile learning-based electronic worksheets on the introduction of the wetland environment.

3. RESULTS AND DISCUSSION

Analysis

The activities carried out at this stage included analyzing the needs of mobile learning-based electronic worksheets in the introduction of the wetland environment. Needs assessment was performed through interviews with teachers of children in group B at Pertiwi Kindergarten in Berangas Timur, Alalak, Barito Kuala. The interviews were conducted in accordance with the interview guidelines, yielding an average percentage score of 84% in the agree category. Data from interviews with teachers revealed that Pertiwi Berangas Timur Kindergarten, Alalak, Barito Kuala, implemented the 2013 curriculum. Textbooks purchased from publishers were used as learning media. The material in the package book did not yet address the life of the environment around children, which is synonymous with the wetland environment. The worksheets used by the teacher were also unappealing because they contained uncolored images.

Design

The design stage was the planning stage of learning media in the mobile learning-based electronic worksheet application based on the previous needs analysis stage. This stage included the following activities: the competency map was the first stage of elaborating the competencies that children will achieve after using mobile learning-based electronic worksheets. Second, the material map, in which a selection of materials suitable for the wetland environment were carried out during the activity. The materials obtained from compiling this material map were included in a mobile learning-based electronic worksheet. Table 3 shows the material map that were created.

Tabel 3 Wetland Environmental Materials Based on Themes

Theme	Material
Animals	Get to know the types of animals
	Recognize the characteristics of animals
	Distinguish star sizes
Plants	Get to know the types of plants
	Recognize the characteristics of plants
	Compare the sizes of many and few

Third, outline the media content; in this activity, the main material used in writing the script was prepared based on the previously created material map. The media outline included fundamental competencies, indicators, and display designs tailored to the introduction of wetland animals and plants. Fourth, media script preparation was an activity that involved writing materials and questions that will be included in electronic worksheets during the development stage.

Development

The development stage was the production stage, which referred to the previously created script. At this stage, the media were also validated by media experts, material experts, and practitioners (teachers). Among the activities carried out during the development stage were: (1) Pre-production began with the preparation of the equipment used, such as paper, laptop, mouse, and software tools such as software. (2) the production stage, which was the process of creating mobile learning-based electronic worksheets. The first step was to create pictures that corresponded to the material. Figure 1 depicts the display of a child's electronic worksheet.

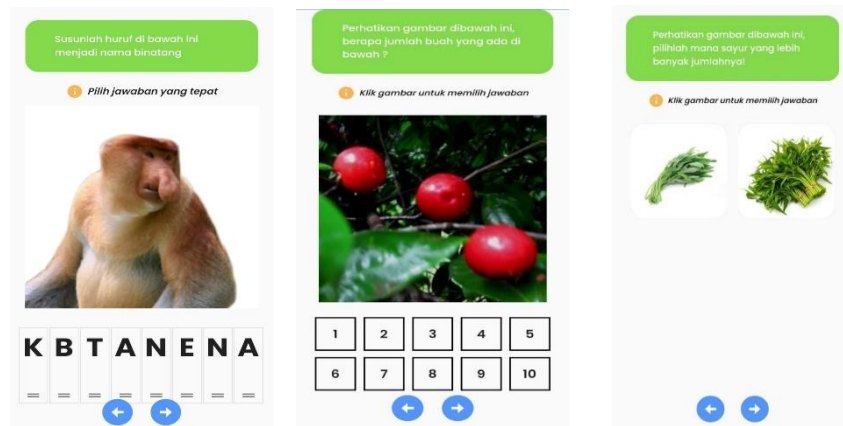


Image 1. Display of Mobile Learning-Based Electronic Worksheets

The initial product test was carried out by experts, which consisted of validating media experts, material experts and practitioners (teachers). This validation activity was conducted with the aim of evaluating the development of material that had been compiled on mobile learning-based electronic worksheet products. Evaluation results from media experts on mobile learning-based electronic worksheet products can be seen in Table 4. Based on data from Table 4, it can be inferred that the results of the assessment with an average score of 4 were in the good category. The assessment of material experts obtained a score of 4.1 in the good category. The material expert's assessment can be seen in Table 5. Furthermore, the assessment from practitioners was carried out by two teachers in group B at Pertiwi Kindergarten, Berangas Timur, Alalak, Barito Kuala. Assessment of practitioner 1 (teacher 1) obtained a score of 3.6 in the good category. Practitioner 1's assessment can be seen in Table 6. While the assessment of practitioner 2 (teacher 2) obtained a score of 3.8 in the good category. Assessment from practitioner 2 can be seen in Table 7.

Table 4. Media Expert Assessment

No	Assessment Aspects	Assessment Indicators	Score
1	Language	Texts can be read properly	4
		Texts sizes are in appropriate fonts	5
2	Software Engineering	The effectiveness and efficiency of learning media programs	4
		Management of learning media programs	4
		Usability of learning media programs	4
		The smoothness of the learning media program	4
		Learning media program compatibility	3
		Instructional media program installation	4
		Clarity of electronic worksheet instructions	4
		Sound control (background music, sound effects and narration)	4
		Learning media navigation	4
		The suitability of the layout of each page	4
3	Audio Display	Visual	
		Text readability	4
		Screen display quality	4
		Image quality	5
		Animation quality	4
		Sound effects quality	4
		Narrative quality	4

	Selection of sound effects	4
	The attractiveness of the pictures and contents	4
Average		4

Table 5. Material Expert Assessment Assessments Indicators

No	Assessment Aspects	Assessments Indicators	Score
1	Learning	The suitability of the electronic worksheet material is in line with the learning objectives	3
		The suitability of the electronic worksheet material is based on the child's developmental level	4
		Ease of participants in understanding the material in the electronic worksheet	3
2	Contents of LKPD	The material presented provides new information	4
		The material presented is complete	4
		The material presented is in high quality	4
		The attractiveness of electronic worksheets	3
		The accuracy of the image in the electronic worksheet	3
		The suitability of the material in the electronic worksheet with the concept of a wetland environment	5
3	Questions on electronic worksheets	Suitability of questions with learning objectives	4
		The suitability of the questions with the material	4
		Clarity of sentence structure in the problem	4
		The accuracy of language use in the questions	4
		Selection accuracy and font size	3
		The images contained in the questions are in accordance with the material	4
		Ease of children in understanding the questions	4
		Proportional drawing layout	3
		The questions presented are in accordance with the level of students development	4
Average		4.1	

Table 6. Practitioner Assessment 1 Assessment Indicators

No	Assessment Aspects	Assessment Indicators	Score
1	Aspects of Content Quality and Purpose	The suitability of the material presented with the core competencies	4
		The suitability of the use of words with EYD	3
		Use of communicative language	3
		Clarity of learning objectives	4
		Completeness of the material presented	4
		Completeness of the material and questions presented	4
		The contribution of electronic worksheets in helping teachers explain material	4
		The usefulness of electronic worksheets in increasing children's activeness in learning activities	4
2	Aspects of Instructional Quality	The usefulness of electronic worksheets in providing independent learning opportunities	4
		The contribution of electronic worksheets in helping children understand the concept of introducing a wet environment	4
		The usefulness of learning media in helping children learn in a fun way	4
		Usefulness of learning media in increasing children's learning motivation	4
		Ease of understanding the content of learning media	3

3	Technical Aspects	Quality	Ease of learning media to use anywhere and anytime	4
			Clarity of learning media	3
			Compatibility of color combinations and compositions	4
			The correct selection of type and size of letters	3
			The attractiveness of images and animations in learning media	3
			The suitability of sound effects with the conditions that are currently taking place in the learning media	3
Average			3,6	

Table 7. Practitioner Assessment 2

No	Assessment Aspects	Assessments Indicators	Skor	
1	Aspects of Content Quality and Purpose	The suitability of the material presented with the core competencies	4	
		The suitability of the use of words with EYD	4	
		Use of communicative language	4	
		Clarity of learning objectives	3	
		Completeness of the material presented	5	
		Completeness of the material and questions presented	4	
		The contribution of electronic worksheets in helping teachers explain material	4	
		The usefulness of electronic worksheets in increasing children's activeness in learning activities	4	
2	Aspects of Instructional Quality	The usefulness of electronic worksheets in providing independent learning opportunities	4	
		The contribution of electronic worksheets in helping children understand the concept of introducing a wet environment	4	
		The usefulness of learning media in helping children learn in a fun way	4	
		Usefulness of learning media in increasing children's learning motivation	4	
		Ease of understanding the content of learning media	4	
		Ease of learning media to use anywhere and anytime	4	
3	Technical Aspects	Quality	Clarity of learning media	3
			Compatibility of color combinations and compositions	4
			The correct selection of type and size of letters	3
			The attractiveness of images and animations in learning media	3
			The suitability of sound effects with the conditions that are currently taking place in the learning media	4
			Average	

Product Revision

Experts had validated the initial product trial activities. Furthermore, the product was revised in response to suggestions and feedback from media experts, material experts, and practitioners on the product being developed in the form of a mobile learning-based electronic worksheet. Experts suggested that there were still a number of features that were difficult for children to use, unclear instructions for use, unfinished color use, and several images that can be interpreted in multiple ways. The researchers improved the mobile learning-based electronic worksheet product in the introduction of the wetland environment based on the suggestions and input provided. Researchers improved the contrast between the color of the writing and the color of the box, replaced clear and intact images, and made difficult-to-use features easier for children to use.

Implementation

The implementation phase was conducted to assess the quality and effectiveness of mobile learning-based electronic worksheet products in the introduction of the wetland environment. Trials of mobile learning-based electronic worksheet products were included in this phase of implementation. Field trials were conducted in group B TK Pertiwi, Berangas Timur, Alalak, and Barito Kuala with a total of 28 early childhood respondents divided into 14 experimental children and 14 control children. The results of the field trials were compared to the pretest and posttest scores in the experimental and control groups. The experimental group received treatment with electronic worksheets based on mobile learning, whereas the control group received treatment with worksheets commonly used in learning activities. Table 8 displays the average pretest and posttest scores of the experimental and control groups based on the results of the trials conducted.

Table 8. Results of n-gain calculations for the experimental group and the control group on Field Trials

SAMPLE GROUP	N	PRETEST	POSTEST	IDEAL SCORE	N-GAIN SCORE	N-GAIN PERCENT	CATEGORY
EKSPERIMEN	14	51.07	89	100	0.77	77	Very effective
CONTROL	14	47.57	70	100	0.43	43.11	Less effective

Table 8 demonstrates that there was a difference between the experimental group treated with mobile learning-based electronic worksheets and the control group treated with worksheets used in schools in terms of the average score for understanding material on the wetland environment for early childhood. Based on n-gain calculations, the effectiveness of children's worksheet products using mobile learning-based electronic worksheets achieved an average score of 77% in the very effective category for the experimental class. Meanwhile, the N-gain score data for the control group, obtained by using the **Electronic worksheet**, a commonly used in school, yielded a score of 43.11%, placing it in the less effective category. As a result, it is possible to conclude that the use of mobile learning-based electronic worksheets in the introduction of the wetland environment is very effective as a learning medium in Pertiwi Kindergarten, East Berangas, Alalak, and Barito Kuala to introduce children to their surrounding environment.

The finding is in line with (Sari, 2016) which revealed that the media serves to provide convenience for students in obtaining knowledge or information. In addition, the existence of media in the classroom can create an active and fun learning atmosphere (Wangge, 2020). As a result, the presence of media in learning activities is critical. Rapid technological advancements will undoubtedly affect educators' use of media in the classroom. Educators have started using mobile media. This is because children prefer mobile-based media. Mobile learning is a learning medium based on Android that can be used at any time and in any location (Wati et al., 2021). Thus, it is very easy for educators to provide material to students. The presence of this interactive multimedia can help children to get to know the objects they see (Arnada & Putra, 2018). In addition, digital media can create fun and varied learning for children, increase interest, and develop children's literacy (Hendraningrat, 2021) (Maghfirah et al., 2022) (Razfar & Yang, 2010). As a result, the proper and wise application of technology can provide stimulating and enjoyable learning media for children (Nurjanah & Mukarromah, 2021). Thus, learning media that incorporates technology is critical to promoting engaging and enjoyable learning in early childhood. However, the use of technology as a medium must also consider elements of child friendliness and attractiveness (Badri Munawar, Ade Farid Hasyim, 2020).

The product developed in this study was an electronic worksheet based on mobile learning in the introduction of the wetland environment. The selection of the product concept developed was based on the needs analysis that had been done before. Referring to research conducted by (Suprihatin; dkk, 2022), Electronic worksheets can be used as teaching materials to create engaging learning. One of the benefits of this electronic worksheet is that it contains contextual information. Contextual learning is a learning concept that the teacher employs by connecting material that is relevant to real-life situations encountered by children on a daily basis (Anggraini, 2017). Learning management in contextual-based early childhood education must be utilized so that children can grow and develop optimally (Nursyamsi & Rahmah, 2019). The wetlands environment should be introduced to children who live on the river's banks. The introduction of children to the wetland environment can provide children with basic knowledge about the various types of plants and animals that live in the wetland environment, which is the closest environment to children. However, when using electronic worksheets, several factors must be considered: 1) the material in the electronic worksheet must be appropriate for the child's age, 2) the need for assistance for children when using electronic worksheets, and 3) the features used in electronic worksheets must be simple for children to use. child. This is done in order for the **Electronic worksheet** to support the attainment of the anticipated learning objectives. The material in this electronic worksheet only discusses environmental topics related to wetlands, which is the environment that is closest to children who are dated on the river banks, which is a limitation of this research's efforts to develop electronic worksheet products.

4. CONCLUSION

This study resulted in the creation of a mobile learning-based electronic worksheet on the introduction of the wetland environment in Early Childhood Education. Based on the evaluations of subject matter experts, media experts, and practitioners, as well as field trial evaluations, mobile learning-based electronic worksheets had proven to meet the eligibility criteria. Meanwhile, field trials on group B children at Pertiwi Kindergarten showed that mobile learning-based electronic worksheets were effective in providing children with knowledge and understanding of their surroundings. Future researchers should be able to create electronic worksheets based on mobile learning on other topics that are relevant to children's needs.

COMPETING INTERESTS

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