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Development of Wordwall Educative Games Applications as Learning Media For Understanding PJOK Materials For Elementary Students

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Abstract
This article discusses the design and product development of PJOK learning media in elementary schools in the form of wordwall educational game applications and to determine the effectiveness of using wordwalls in PJOK learning as measured by students' understanding of PJOK material using wordwalls. The research was conducted to support teacher competency in Technological Pedagogical Content Knowledge (TPACK) abilities. The research approach used is a mixed method with a 4-D development model design, namely define, design, develop, and disseminate. Data obtained by means of questionnaires, documentation, and interviews. The results of the study were 1) wordwall product designs were made based on an analysis of teacher needs for learning media in elementary schools and based on curriculum analysis in the form of Basic Competency analysis and its compatibility with the characteristics of grade 2 elementary school students, 2) the resulting product from the research was wordwall educational games in 4 types of games, namely maze chase, airplane, balloon pop, and open the box, and students' ability to understand PJOK material very well through the help of wordwall games. Based on the research results, the wordwall application can be recommended for further development in other Basic Competencies accompanied by learning videos.
Keywords: *: wordwall educational game application, learning media, PJOK, TPACK*

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INTRODUCTION

The digital era which is increasingly advanced along with the times has slowly taken a big role in human life [1] . The digital era is characterized by the widespread use of internet networks in all fields, so that distance is not an obstacle. This digital era has provided many conveniences to humans [2] , just by sitting in front of a computer or with a smartphone, humans can communicate and interact with different countries, as well as economic transactions can be carried out from home. The world of education in this digital era has also experienced many rapid developments, one of which is electronic learning (E-Learning). E-learning is an innovation that can be utilized in the learning process (Husnussaadah, 2021). The world of health cannot be separated from following developments in this digital era, for example, for health insurance arrangements, it is enough to access the application that has been made, when making a reservation or consulting a doctor, you can also use the application. In the digital era, technology plays an important role. Especially internet technology has become king in every field of human life. This indicates that the digital era has had a huge impact in the fields of technology, information and communication, the economy, education and health (Desmarita Khairoes dan Taufina, 2019). In this digital era, technology is developing quickly and rapidly, and is even attached to various aspects of human life. The digital era is an era in which almost everyone is familiar with digital technology, from children, adolescents and adults [5] .

Education is one of the sectors that has been affected by digital developments, namely encouraging the process of technology integration in a learning process. These conditions require teachers to be able to create innovative learning accompanied by Technological Pedagogical Content Knowledge (TPACK) skills. Technological Pedagogical Content Knowledge (TPACK) is a development of Pedagogical Content Knowledge (PCK) which was first initiated by Shulman in 1986. According to Rahmadi [6] in the 21st Century it is not enough for teachers to only have knowledge of the material but also have knowledge as well as skills in using various technological devices. A teacher must master Pedagogical Knowledge (PK) and Content Knowledge (CK) in this case the teacher is not only able to master the content/material, but is able to master the scope of pedagogy in the learning process. Initially, this framework only combined pedagogical abilities and knowledge content/materials. Given that the ability to master technology is a very important part, so this framework is then developed by combining elements of technology.

Technology is one of the elements that must be mastered by the teacher. Technological developments have had a positive influence on the world of education, especially in the learning process [7] . Technology can be used in the implementation of learning, both for compiling teaching materials, carrying out learning activities, or for making learning media. Developing technology has led to the birth of various learning media [8] , especially in creating interactive and innovative learning media.

Interactive learning media can support teachers in carrying out the learning process in class. Interactive learning media is useful for increasing student learning motivation, so that it has an impact on increasing student learning outcomes and being able to improve the quality of learning [9] . One of the media that can be developed by teachers to support the learning process is wordwall application media.

Wordwall is a website-based application that can be used to create learning media such as quizzes, matchmaking, pairing, anagrams, random words, word search, grouping, and so on [10] . Wardwall is a website-based digital platform that can be used as a forum for teachers to create fun learning, so that students don't feel bored and remain enthusiastic in participating in the learning process. Wordwall is designed to create quiz-based educational games that can assist teachers in measuring students' level of understanding of subject matter [8] , including in the implementation of classroom learning on subject matter (PJOK).

The purpose of this research is to describe the application design and produce interactive application development products for wordwall educational games, as well as to find out their effectiveness so that an overview is obtained about students' abilities to understand PJOK material in elementary schools.

METHODS

The approach used in this study is a mixed method approach (mixed research), namely a combination of qualitative and quantitative methods. According to [19] mixed research is research that combines qualitative and quantitative research. The use of a mixed method approach in this study is based on the type of instrument and collection technique used. A qualitative approach was used for observation, interviews and documentation, while a quantitative approach was used for the questionnaire technique used in the preliminary stage by conducting a survey of PJOK SD teachers across Indonesia.

The device development model used as the basis for this research is the model suggested by Semmel as stated by Trianto [20] . The device development model suggested by Thiagarajan, Semmel and Semmel in 1974 is the 4-D model, this model consists of 4 stages of development, namely define, design, develop, and disseminate, namely definition, design, development, and deployment . The data obtained was analyzed by Miles and Huberman Analysis. Three steps in conducting data analysis are data condensation , data display, and verifying [21] . The developed product is validated using a validity instrument assessment to determine the quality of the wordwall product being developed. The validation carried out was content validation by an expert, namely the SD PJOK teacher. After the data is declared feasible, the product is then tested on a limited basis with respondents to find out the response to the assessment carried out by the teacher as a user by using assessment sheets and student observation sheets with criteria for making decisions in media validation can be seen in table 1. Media can be used if the validator's assessment is categorized as feasible and very feasible.

Table 1. Average score interval evaluation validator

intervals Average Score (%)	Category validity
90 – 100	Very Good
80 – 89	Fine
70 – 79	Enough
60 – 69	Less
<60	Very Not enough

In addition, observation activities were also carried out for students to find out students' understanding and attitudes in the learning process with descriptions of descriptors and interpretations as follows:

1. Understanding: assessed from the accuracy in answering questions on the wordwall, with indicators
   a. Correct answer
   b. Determine the answer yourself (unaided)
   c. Operate media yourself (unassisted)
   d. It doesn't take long to answer

Score 4 if all indicators are met, value 3 if only 3 indicators are met, value 2 if only 2 indicators are met, value 1 if only 1 indicator is met

Table 2. Interval average gain score student

intervals Average (%)	Category validity
x = 0	Nobody 0
< x < 25	Most Small
25 < x < 50	Nearly Half
x = 50	Half
50 < x < 75	Partially Big
75< x < 100	Almost in all
X= 100	Completely

RESULTS AND DISCUSSIONS

Defining Stage (Define)

Activities at this stage are carried out to determine a problem contained in the learning process which is carried out by defining development requirements. This stage is the stage carried out to analyze the needs in the learning process. At this stage a preliminary study was carried out in the form of a literature review on wordwalls, PJOK in SD, innovative learning media, and an analysis of the PJOK SD curriculum.

This wordwall application was chosen to be developed because it has several advantages, namely wordwall is not paid or free for basic options with a choice of several templates, but if you want to add another template than what has been provided, it can be accessed after payment is made. Another advantage of the wordwall is that after it is made accessible to anyone by clicking on a link that has been shared via WhatsApp, Google Classroom, or others. In addition, the games that have been made can be printed in PDF format, so they can be accessed offline and will make it easier for those who experience problems with the network or internet quota [20] . This Wordwall can be applied to all fields of study and all levels of education, of course, with development that is adapted to the curriculum used in the study. Currently, education in Indonesia still uses the 2013 curriculum. Based on the 2013 curriculum learning at all levels of education is carried out in an integrated thematic manner, namely combining several fields of study in one theme, with the exception of the study areas of Religious Education and Physical Education Sports and Health (PJOK), carried out separately (partially) delivered by PJOK study teachers. Providing PJOK material in these schools is knowledge that Indonesia is based on God, which recognizes the religion adhered to by citizens and provides facilities for implementing religion in the education sector. Religion is recognized in the education system in Indonesia, this is clearly stated in the goals of national education in Republic of Indonesia Law no. 20

PJOK's position among other subjects in schools is as the core or "core" in the national education curriculum. Therefore, in practice in the field, it is necessary to provide an open process of understanding and application, so as to produce attitudes and behaviors that are inclusive and positioned on an equal footing with other subjects or even prioritized [22] . PJOK is not the second subject matter or not a field of study at all, but has a very noble mission, especially the internalization of good values for students.

Design Stage (Design)

The design of this wordwall application is based on the results of a survey that has been conducted on

Preliminary study, namely to find out the needs of PJOK teachers regarding the design of PJOK learning media that are in accordance with the characteristics of elementary students and in accordance with PJOK material in elementary schools. Based on the survey results, it was found that 1) Fun PJOK learning is games, because they can

motivate and make it easier for students to understand the material, 2) Games that have been used by teachers are web-based games in the form of quiziz, kahoot, wordwall, educandy, 3) Design of web-based games that are expected are attractive in color, content contains practice questions, duration is between 10-15 minutes, interactive, interesting, fun, increases student interest and motivation, makes it easier for students to understand material and makes students have noble character. After obtaining data regarding the needs for the type of PJOK learning media in elementary schools, then the stage of designing educational wordwall game products was carried out. The wordwall product design is adjusted to the templates available in the wordwall application. Figure 1 below is the template available in the wordwall application.

Figure 1. Game templates on wordwall

Wordwall design is focused on the content of questions and answers, as well as the selection of types of games. The selection of types of games must be adjusted to the characteristics of elementary school students and the appropriate level of difficulty for elementary school students. Characteristics of grade 2 elementary school children according to (Ramadhan Almadani & , Dede Indra Setiabudi, 2022) that from the aspect of cognitive development at this age it is marked by the rapid increase in children's critical power and ability to solve problems, while from the social emotional aspect children really want to be accepted by their peers and try a lot of new personalities to find out which one suits them best. So the types of questions used in this study are maze chase, airplane, balloon pop, and open the box.

Likewise, the content of the questions and answers must be in accordance with the material presented through the accompanying video learning media that is already available. The questions formulated were made in the realm of Higher Order Thinking (HOT). In line with Pratiwi and Maharani [24] argued that PJOK learning to develop HOT can be done at the analyzing level, evaluating level, and creating level.

The wordwall game is a game that is packaged in quizzes in the form of subject matter questions, so wordwall can function as an assessment tool that can measure student learning outcomes [25] . This wordwall educational game belongs to online games which are suitable for learning at all levels, starting from kindergarten to tertiary level. The selection of online games is in line with technological developments in which gadgets are already familiar with children's daily lives, so it is hoped that online-based game play can optimize the learning process carried out by students in PJOK subjects in elementary schools.

Development Stage (Developing)

The development of a wordwall application for SD PJOK material was made based on analyzes of student needs. After the process of inputting the question content on the wordwall website, then the product being developed is validated. The validation used is content validation by experts who are competent in their fields. The product validation

that was developed was carried out on various aspects, namely aspects of the content of the questions, product appearance, and the suitability of the questions with the characteristics of grade 2 elementary school students.

The wordwall game product that was developed went through three validation stages. At each stage, input and suggestions submitted by the validator are recorded and corrected. The results of the 1st validation on all aspects show that the wordwall game product gets a score percentage of 79% in the sufficient category. The validation results for the 2 wordwall game products got a score percentage of 88% in the good category. The results of the validation of the 3 products got a score percentage of 94% in the very good category. Meanwhile, the results of the 4th validation which is a reference for product feasibility to be carried out at the trial stage get a perfect score percentage of 100% in the very good category.

The final product of the wordwall application resulting from this research is the development of an existing template, and produces 4 types of games in wordwall

After the wordwall educational games media product has been revised and validated, this product is ready to be tested in limited classes. A limited trial was conducted in class 2 of SDN Margomulyo I. At this stage, user ratings were obtained by PJOK teachers at SDN Margomulyo I and the results of student observations when this media was applied. Here are the results

Table 3. Results Assessment Teacher PJOK elementary school Margomulyo I To Product Media Games Educative *Wordwall* For Material PJOK Class 2 SD On Stage Test Try Limited

No	Aspect Note Value	Assessment 1	2	3	4
1	CONTENT QUESTION				
	1. suitability question with material Which presented				√
	2. suitability question with option answer				√
	3. Accuracy writing editorial question				√
	4. Accuracy writing editorial answer			√	
	5. Accuracy use of letters capital				√
	6. Accuracy use sign read			√	
2	VIEWS PRODUCT				
	1. attractiveness voice music				√
	2. attractiveness figure				√
	3. attractiveness design color			√	
	4. attractiveness design picture				√
	5. attractiveness design writing				√
	6. attractiveness type game			√	
3	COMPATIBILITY WITH CHARACTERISTICS STUDENT CLASS 2 SD				
	1. Size letter			√	
	2. Long text question				√
	3. Long text answer				√
	4. Type game				√
	5. Amount question				√
	6. Time duration			√	
Amount				18	48
score acquisition			66		
Mark			92%		
Criteria			Very Good		

Based on table 3, the user (PJOK teacher) gives a very good assessment of this wordwall product. This assessment is given based on 3 aspects, namely the content of the questions, the appearance of the product and the suitability of the product with the characteristics of 2nd grade elementary school students.

In addition to user ratings, data was also obtained regarding the use of this wordwall application by students. Based on these results it was found that almost all grade 2 students at SDN Margomulyo I were able to answer questions on the wordwall very well and most of these students showed a very good attitude. The following are the results as outlined in table 4.

Table 4. Observation Results of Class 2 Student Activities at SDN Margomulyo I During TrialLimited

No	Student	understanding				Attitude	
		4	32	1	4	3	21
1.	Students 1		√			√	
2.	Students 2	√			√		
3.	Students 3	√			√		
4.	Students 4		√		√		
5.	Students 5	√			√		
6.	Students 6	√			√		
7.	Students 7	√			√		
8.	Students 8	√			√		
9.	Students 9	√			√		
10.	Students 10		√			√	
11.	Students 11	√			√		
12.	Student 12				√		
13.	Student 13				√		
14.	Student 14				√		
15.	Student 15				√	√	
16.	Student 16						
17.	Student 17	√	√		√	√	
18.	Student 18						
19.	Student 19				√		
20.	Student 20				√		
21.	Student 21				√		
Amount Student		16	5		17	4	
% student		76	24 %		81 %	19 %	

The wordwall product in this study has been tested for feasibility with very good value and is very feasible to use. The assessment aspects for these products are the content of the questions, product appearance and suitability with the characteristics of elementary school students. In the aspect of the content of the questions, the questions presented must be in accordance with the subject matter, the questions and answers presented must match. For this reason, in presenting quizzes in the form of a wordwall, apart from skills in product design, skills are also needed in designing the content of the questions. The questions presented should not cause students' misconceptions. The ability to make these questions needs to be owned by the teacher. Teachers need to practice in preparing good questions, because this is one part of the competence that must be mastered by the teacher, namely pedagogical competence. This pedagogic competence can be seen from the teacher's ability to plan, process and evaluate learning. So that in this case the teacher acts as a planner, processor and evaluator [26]. As an evaluator the teacher must be able to carry out an assessment of the entire learning process, both assessing the competency achievement of students, preparing progress reports on learning outcomes that can be used for improvement

and correction of the learning process. Measuring student learning outcomes is also in line with measuring the achievement of learning objectives. It can be packaged with interesting media that causes students to be enthusiastic about learning, one of which is presented in a wordwall.

Wordwalls that are presented to elementary school students must match their age characteristics, for example in terms of color display, font size and type, language used, character traits and short sentence length. This needs to be considered so that this wordwall is not boring for students. Characteristics of children aged 2nd grade elementary school according to [27] that from the aspect of cognitive development at this age it is marked by the rapid increase in children's critical power and ability to solve problems, while from the social emotional aspect children really want to be accepted by their peers and try a lot of new personalities to find out which one suits them best. According to Darajat [28], the characteristic of religious development at this age is that a child's belief in God is not based on the results of his thinking but an emotional attitude that requires protection. His relationship with God is emotional and individual, so that it can be seen from his personal prayers and children will be very happy and happy if they participate or are followed in religious activities that interest them

CONCLUSION

Design application interactive games educative wordwall as a learning medium to understand PJOK material in SD is designed based on 1) analysis need Teacher on the types and models of learning media suitable and appropriate for elementary school students. From results analysis obtained that application wordwall need to be accompanied by media containing material teach, so make it videos wardwall companion learning 2) analysis curriculum, that is analyze Competence The basis that will be developed through the media wordwall . Ability student in understand material PJOK in SD with use media learning application interactive games educative wordwall rated very Good Because in answer questions Which There is on wordwall answer Correct, determine answer Alone (No assisted), No need time long for answer.

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