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Development of Wordwall Media on Learning to Compare Object Weight in Grade 1 Elementary School

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Abstract

The research was conducted based on conditions that occur in the field, where students find it difficult to learn mathematics, especially the material weighs objects. This causes students not to respond to educators' questions during question-and-answer activities. In addition, digital-based learning media for these materials are not yet available. Therefore, researchers developed digital-based learning media in the form of wordwalls. The purpose of the study is to describe the analysis of the needs of digital-based learning media, the design and development of wordwall media, the feasibility of wordwall media, and the response of educators and students to the wordwall media that has been developed. The study was conducted using the ADDIE method. Data collection through observation, interviews, document studies, expert validation, as well as the response of an educator and 32 students to the developed media. The results of the analysis showed that digital-based learning media was needed, media design was carried out through wordwall and then validated by 2 experts obtaining feasible criteria with a percentage of material expert validation of 90.62% and 87.5% validation of media experts so that the developed wordwall media could be used in learning. Then the results of the questionnaire of student responses to the developed media obtained 93.82% results with very practical criteria. Thus, wordwall media on the material comparing the weight of objects in grade 1 elementary school is valid and very practical to use.

Keywords: *learning media development, wordwall, comparing the weight of objects.*

INTRODUCTION

Mathematics is a science that is known from elementary school to university level (Abidin et al., 2018). Mathematics contains concepts and principles by presenting symbolic language to familiarize students with reasoning so they can think systematically in solving problems (Yayuk, et al., 2018). Symbols have concepts and principles that refer to mathematics so they can be visualized more simply.

In 2018, according to PISA (Program for International Student Assessment), Indonesia was ranked 72nd out of 78 countries around the world with a score of 379. This shows that Indonesia is included in the group of countries with low mastery of mathematics. If we look at education, students do not learn and understand mathematical concepts so their application is low. Thus, learning must be improved so that it is of higher quality, including elementary school mathematics subjects.

One of the mathematical concepts included in elementary school is comparing the weight of objects. In curtilage, comparing the weight of objects is taught in class 1. The related basic competency is 3.8 identifying and determining the length and weight of objects using non-standard units using certain objects or situations. After learning, students can compare the weight of objects in their lives.

The reality in the field is that the material comparing the weight of objects in class 1 has difficulties in learning achievement where most students' scores do not meet the KKM. This is in line with what Selly (2015) found in his research, which revealed that students' scores were less than the KKM and when asked questions, students were still confused about responding to questions asked by educators.

Based on the problems that arise, there are many influencing factors, one of which is class variations which make students bored so they cannot understand the material well. Educators can vary their classes by using learning media in the classroom (Yunitasari et al., 2019). Learning media makes it easier for educators to convey material concepts and achieve learning objectives efficiently (Kustandi &; Sutjipto, 2011).

As time goes by, technology has had an impact in various areas of life, one of which is education which is used as learning media. Learning media from technology are very diverse, one of which is wordwall. Wordwall is a digital-based learning media that can be accessed online via wordwall.net. This media is interesting to use because it is in the form of audiovisuals packaged in game form. Students can be directly involved in using this media. The choice of learning media for students must pay attention to their attractiveness so that students' motivation and interest increases (Febrita &; Ulfah, 2019).

Several previous studies related to wordwall media include research conducted by Niken, et al (2022), namely using wordwall as a game to support grade 1 students' numeracy learning. The research stated that the use of wordwall had a positive effect on students' numeracy skills. Khosi, et al (2023) revealed that the results of student evaluations using wordwall increased, namely in cycle I showed student scores reached 51.72%, cycle II obtained 69.48%, and cycle III reached 100%. Apart from that, Wafiqni &; Mestyana (2021) conducted research related to the very effective application of the wordwall application in learning mathematics with whole number material in grade 1.

Based on the results of the literature study, quite a lot of development and application of wordwall media has been found, but the development of wordwall media with material on weighing objects in grade 1 of elementary school has not been found, so researchers conducted their research in order to improve the quality of learning and students' understanding of the concepts being taught.

RESEARCH METHODS

The research method used is the ADDIE model which is implemented through 5 stages, namely analyze, design, development, implementation, and evaluate.

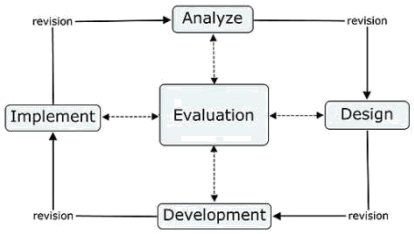

Figure 1
Stages of the ADDIE Model

Data was obtained through: (1) observation of student learning; (2) interviews with grade 1 elementary school teachers; (3) document study to complete the information obtained; (4) validation questionnaire given to material and media validators; and (5) questionnaires distributed to educators and students. The instruments used to explore data are presented in the following table 1:

Table 1
Observation Instrument

No	Aspect	Observation Results
1	Mathematics learning	
2	Student activity	
3	Able to do questions	

Table 2
Interview Instrument

No	Aspect	Interview results
1	Curriculum	
2	Mathematics Learning	
3	Obstacles to the learning process	
4	Availability of learning media	

Table 4
Material Validation Sheet Instrument

No	Aspect	Score			
		SB	B	C	K
1	Explanation of concepts in accordance with Core Competencies				
2	Explanation of concepts in accordance with Basic Competencies				
3	Wordwall media contains the concept of material comparing the weight of objects				
4	Presentation of complete and appropriate material				
5.	The material is realized clearly and systematically				
6	Sample questions can make it easier for students to understand concepts				
7	Simple concept questions so that students can understand the material				
8	The questions displayed are in accordance with the indicators that have been designed				

Table 5
Media Validation Sheet Instrument

No	Aspect	Score			
		SB	B	C	K
1	Concepts relevant to Core Competencies				
2	Concepts contained relevant Basic Competencies				
3	The concepts contained are relevant to the material comparing the weight of objects				
4	Availability of sample questions				
5	Available questions according to predefined indicators				
6	The material is presented in depth and thoroughly				
7	The material is arranged systematically				
8	The concept is clearly presented and easy to understand				
9	Wordwall is interesting to use in learning				
10	An interesting mix of colors, writing, and images				
11	The language used corresponds to the user's character				
12	The language				

	listed is according to the user's age level	
13	The developed media can help the learning process	
14	*Wordwall* is easy to use in learning	

Table 6
Educator Response Questionnaire Instrument

No	Aspect	Valuation			
		STS	TS	S	SS
1	Effective and interactive learning				
2	Practical to use for diidik participants				
3	Students use wordwalls appropriately				
4	Wordwall *media* makes students enthusiastic in understanding concepts				

Table 7
Student Response Questionnaire Instrument

Aspect	Valuation			
	STS	TS	S	SS
Wordwall is difficult to use				
Interesting color mix				
Convenient when applied				
Interesting loaded images				
Increase enthusiasm in understanding concepts				
Learning becomes more fun				
It's hard to understand the concept of comparing the weight of objects				
Discovering new knowledge after using media				
Contains more emblems than				
Contains emblems less than				
Language is easy to understand				

Table 8
Document Study Instrument

No	Document	Analysis Results
1	Curriculum	
2	Student Books	
3	Learning Media	
4	Mathematics Learning	

The research was conducted at SDN 2 Tawangbanteng from November to December with 2 participants involved, namely 2 validators, namely from educators in the research school and 1 homeroom teacher in grade 1, 32 students to get practical scores on *wordwall media*.

Data analysis is carried out qualitatively and quantitatively. Qualitative analysis uses the *Miles and Huberman models.*

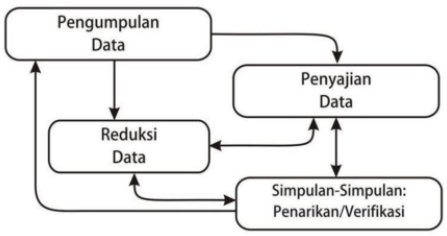

Figure 2
Miles and Huberman Model Analysis Stage

Quantitative data analysis is carried out after the results of the data are available

which are obtained through validation and response questionnaires. Then the data is analyzed so as to get the percentage of eligibility with the following formula.

Validity Value = $\frac{jumlah\ skor\ yang\ diperoleh}{jumlah\ skor\ maksimum} x\ 100\%$

Criterion:

Table 9
Validity Criteria

Percentage	Criterion
00 – 40,99	Not Worth It
50 – 69,99	Pretty Decent
70 – 84,99	Proper
85 – 100	Very Worth It

(Parsianti, et al., 2020)

To measure the practicality of learners using the same method as calculating validity:

Practical Value = $\frac{jumlah\ perolehan\ \ skor}{jumlah\ skor\ maksimum} x\ 100\%$

With the following criteria:

Table 10
Practical Criteria

Presented	Criterion
00 – 40,99	NoPractical
50 – 69,99	Quite Practical
70 – 84,99	Practical
85 – 100	Very Practical

(Parsianti, et al., 2020)

RESULTS AND DISCUSSION

Development of *wordwall* media on The material weighing objects in grade 1 of elementary school is described based on the ADDIE model as follows:

1. Analyze

   The first stage carried out is analyze or analyze. At this stage, researchers carried out observations on the mathematics learning process in grade 1 of SDN 2 Tawangbanteng. The results found that when questioning and answer learners were silent. Indirectly shows that students have not understood the material presented. This is in line with Selly's opinion (2015) revealed that in learning to weigh objects, students are confused about answering questions given by the teacher.

Table 11
Observation Result

No	Aspects	Observation Result
1	Mathematics learning	Learning mathematics is considered difficult by students and educators have difficulty in conveying concepts so that students understand the material.
2	Student activeness	Students are passive in learning, where when educators ask questions, students tend not to be able to answer.
3	Able to do questions	There are still students who are not able to do the questions provided by the educator
4	Mathematics Learning	Learning takes place less interactive because there are still many students who do not respond to questions raised by educators

The interview was conducted with grade 1 educators of SDN 2 Tawangbanteng. The result obtained from the interview is that the curriculum used is kurtilas. Mathematics learning still cannot be said to be effective because students are less interactive in learning so that student understanding is still low. Low interest and motivation can affect student learning outcomes (Khosi, et al., 2023). Thus the

cause is due to the unattractive state of the class. In the learning process, educators only explain concepts by lecturing without the help of learning media.

Table 12
Interview results

No	Aspect	Interview results
1	Curriculum	The curriculum used is Kurtilas
2	Mathematics Learning	Learning mathematics in grade 1 for students is considered difficult so that the concept is not understood so that mathematics learning must be designed interestingly like playing while learning.
3	Obstacles in the learning process	The obstacles experienced in the learning process, especially mathematics, are little difficulty in stimulating students to actively participate in learning such as answering questions raised by educators.
4	Availability of learning media	Learning media is not available because teachers feel that making learning media takes a relatively long time while teachers also have to complete other administrations related to students and schools.

At the analysis stage, researchers also conducted documentation studies through relevant documents in the development of *wordwall* media on material comparing the weight of objects in grade I elementary school. The documents reviewed are as follows:

Table 13
Results of Reviewed Documentation

No	Document	Analysis Results
1	Curriculum	The curriculum used is Kurtilas. There is one KD that contains material comparing the weight of objects
2	Student Books	The material comparing the weight of objects is only found in theme book 4
3	Learning Media	Learning modes are available, but digital-based learning media on material comparing the weight of objects does not yet exist.
4	Mathematics Learning	Learning takes place less interactive because there are still many students who do not respond to questions raised by educators

Based on the results of the analysis, it was found that students had difficulty in understanding the concept of weighing objects because of the low interest and motivation they had. This is related to the results of interviews with educators, namely in learning, students tend not to answer the questions asked because they do not understand the concept of the material presented. In addition, mathematics learning media on the material weighing the weight of objects is not available. From the explanation above, the results of the analysis show that the development of learning media is needed. The use of learning media can affect the learning outcomes of students (Ramli, et

al, 2018). Therefore, researchers developed wordwall media on material weighing objects in grade 1 elementary school through the next stage, namely design.

2. *Design*

After conducting the analysis, the next stage is for researchers to design the media to be developed. The type of learning media developed is audiovisual. Audiovisual media can increase students' interest and motivation in learning mathematics (Nurfadillah, et al., 2021) Learning media is designed through wordwall.net website. The researcher chooses a template that fits the material. The display added a picture of the scale to show heavier and lighter., added audio for the problem, and background sound to make it more interesting. Here is a look at the media design to be developed:

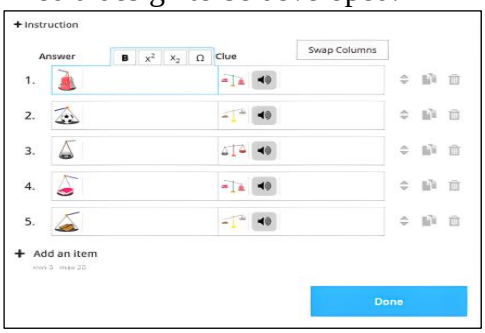

Figure 3
Media Design

3. *Development*

The next stage is to develop the media accessible through Comparing the Weight of Objects - Find the match (wordwall.net) then the display appears as shown in figure 4.

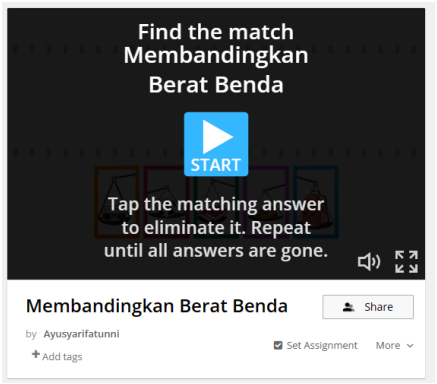

Figure 4
Menu Display

Figure 4 is a visualization of the main menu, click 'START' if you want to do the problem. Then the problem appears with a screen as shown in figure 5.

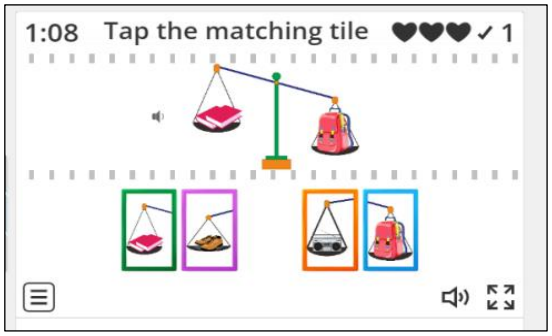

Figure 5
Question

Figure 5 is a problem done by students. The display presentation contains visuals of questions and answers in the form of images. Then the audio questions will appear as questions for students. Background sound is also present on this display so that students do not get bored while working on problems. Right and wrong answers are clearly displayed in the media. Figure 6 is a view of the correct answer choices.

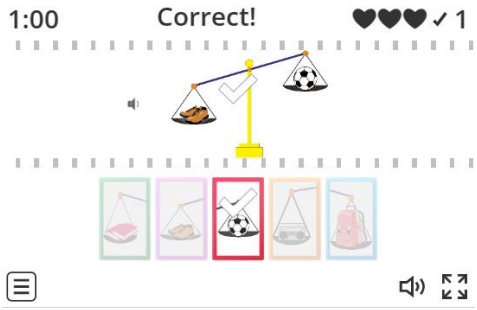

Figure 6
Correct Answer

In figure 6 as validation whether the answer chosen is correct or false so that students understand the concept of the material independently.

After the media is designed, the next step is to validate the media to the validators described in table 14:

Table14
Material Expert Validation Result

No	Aspect	Score			
		SB	B	C	K
1	Concepts relevant to Core Competencies	√			
2	Concepts contained relevant Basic Competencies	√			
3	The concepts contained are relevant to the material comparing the weight of objects		√		
4	Concepts relevant to Core Competencies		√		
5.	The material is realized clearly and systematically		√		
6	Sample questions can make it easier for students to understand concepts	√			
7	Simple concept questions so that students can understand the material	√			
8	The questions displayed are in accordance with the indicators that have been designed	√			

In the table, the results are 5 in the very good criteria and 3 in the good criteria. The results are processed into the following formula

Validation Value = $\frac{jumlah\ pemerolehan\ \ skor}{jumlah\ skor\ maksimum} x\ 100\%$

Value Validity = $\frac{(5x4)+(3x3)}{32} x\ 100\%$

Value Validity = 90.62%

Based on data processing, the validity value obtained is 90.62% to get feasible criteria.

Table 15
Media Expert Validation Result

No	Aspect	Score			
		SB	B	C	K
1	Concepts relevant to Core Competencies	√			
2	Concepts contained relevant Basic Competencies	√			
3	The concepts contained are relevant to the material comparing the weight of objects	√			
4	Availability of sample questions	√			
5	Available questions according to predefined indicators	√			
6	The material is presented in depth and thoroughly			√	
7	The material is arranged systematically			√	
8	The concept is clearly presented and easy to understand			√	
9	Wordwall is interesting to	√			

	use in learning	
10	An interesting mix of colors, writing, and images	√
11	The language used corresponds to the user's character	√
12	The language listed is according to the user's age level	√
13	The developed media can help the learning process	√
14	*Wordwall* is easy to use in learning	√

Table 15 presents validation data from media experts, namely 13 in the very good criteria and 1 in the good criteria. The results are processed through the following percentages:

$$\text{Validity Value} = \frac{jumlah\ pemerolehan\ \ skor}{jumlah\ skor\ maksimum}\ x\ 100\%$$

$$\text{Validity Value} = \frac{(11x4)+(3x2)}{56}\ x\ 100\%$$

Validity Value =87.5 %

The results obtained are 87.5% are in the criteria worthy of being used in the mathematics learning process.

Another note from the media validator is the addition of audio to clarify the image visualization.

Figure 7
Before Repair

Figure 7 is a wordwall media before the improvement with the appearance of the problem in the form of writing, so the image looks small and looks not simple.

Figure 8
After Repair

Figure 8 is the result of improving wordwall media so that there is no problem in writing, but it becomes in audio form.

4. *Implementation*

The application was carried out in grade 1 of SDN 2 Tawangbanteng for one day. The learners involved 32 people. Students take turns using the researcher's laptop to do problems on the *wordwall*. Researchers distributed questionnaires to educators and students to find out the response to the media that had been used.

Figure 9
Students Alternately using wordwall

Picture 10
Enthusiastic Students

Figure 9 is the application of media that has been developed to learners. Students take turns doing questions contained in wordwall media and figure 10 shows a learning atmosphere with students who are enthusiastic about working on questions contained in wordwall.

Table 16
Results of Grade 1 Teacher Response

No	Criteria	Valuation			
		STS	TS	S	SS
1	Effective and interactive learning				√
2	Practical to use for diidik participants			√	
3	Students use wordwalls appropriately				√
4	Wordwall *media* makes students enthusiastic in understanding concepts			√	

In table 16, educators' responses are strongly agree 2 points and agree 2 points. Results are processed into percent form as follows:

The Value of Practicality = $\frac{jumlah\ pemerolehan\ skor}{jumlah\ skor\ maksimum}\ x\ 100\%$

The Value of Practicality = $\frac{(2x4)+(2x3)}{16}\ x\ 100\%$

The Value of Practicality = 87.5 %

The results of processing student response data showed 87.5% with very practical criteria. The results of the response questionnaire for grade 1 students are in the following table:

Table 17
Results of Student Response Questionnaire

Criteria	Valuation			
	STS	TS	S	SS
Wordwall is difficult to use			7	25
Interesting color mix			6	26
Convenient when applied			5	27
Interesting loaded images			4	28
Increase enthusiasm in understanding concepts			5	27
Learning becomes more fun			5	27
It's hard to understand the concept of comparing the weight of objects			6	26
Discovering new knowledge after using media			10	22
Contains more emblems than			15	17
Contains emblems less than			16	16
Language is easy to understand			8	24

Table 17 is the result of the acquisition converted into percent as follows:

The Value of Practicality = $\frac{jumlah\ perolehan\ skor}{jumlah\ skor\ maksimum} x\ 100\%$

The Value of Practicality = $\frac{(265x4)+(87x3)}{16} x\ 100\%$

The Value of Practicality = 93.82%

The practicality value obtained is quite high, which is 93.82% is on the very practical criteria. Therefore, the implementation of *wordwall* media on material comparing the weight of objects is very practical for students to use in learning.

5. *Evaluate*

The evaluation stage is based on the results of the validation of both experts against the developed wordwall media and get decent results. The results of teacher and student responses to the developed wordwall media get very practical results to use.

CONCLUSION

Based on the results of the research conducted, it was concluded as follows:

1. The need analysis of learning media in grade 1 SDN 2 Tawangbanteng is the need for the availability of digital learning media, especially for mathematics subjects with the content of the concept of comparing the weight of objects.
2. Description of the design of wordwall media in audiovisual form by considering images and sounds in order to attract students and can be applied in the learning process optimally.
3. The validation of material experts and media experts shows that wordwall media is feasible to use in learning to compare the weight of objects.
4. The implementation of wordwall media in grade 1 elementary school with material content comparing the weight of objects received a positive response. The results of the responses of educators and students state that learning media is practical to use.

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