

DEVELOPMENT OF WORDWALL EDUCATIONAL GAME-BASED EVALUATION INSTRUMENTS IN MATHEMATICS SUBJECTS IN CLASS IV SDN LALADON 02 BOGOR REGENCY FY 2023/2024

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ABSTRACT

The learning process has been transformed into a form of learning that uses technology, especially the internet. With advances in technological tools in the education sector, researchers are developing existing evaluation tools by utilizing websites *Wordwall*. The results of the needs questionnaire show that teachers have not used evaluation tools to determine student grades. In the assessment process, teachers still apply traditional methods such as paper exams. Therefore, there is a need for evaluation tools that can expand students' ways of thinking when learning. The aim of this research is to determine the feasibility of an educational game-based evaluation instrument *Wordwall* in Mathematics subjects in class IV SDN Laladon 02 Bogor Regency. This research method uses R&D using the Borg and Gall model using the Borg and Gall model development procedure adapted by Sugiyono, however this research only uses 8 stages out of 10 research stages because it is limited by researchers according to research needs and ongoing developments. The subjects of this research were fourth grade students at SDN Laladon 02, Bogor Regency. This research creates an educational game-based evaluation tool *Wordwall* using interview, observation and questionnaire data collection methods. The data analysis technique used is product feasibility testing. The research results showed that the feasibility test by media expert validation was 71% (feasible), language experts were 72% (feasible), learning design experts were 89.3% (very feasible), and material experts were 92% (very feasible). Furthermore, the results of individual trials were 81.6% (very feasible), and small group trials were 80.4 (feasible). The research results show that the evaluation tool is based on educational games *Wordwall* mathematics for class IV is considered suitable for use in the learning assessment process.

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Introduction

In the era of Industrial Revolution 4.0, the use of technology in the field of education is no longer something special, but has become a common thing that must be done. The Fourth Industrial Revolution has brought changes to many aspects of education (Simartata, et al, 2020 p. 9). One of them is in the learning process, the learning process changes to a technology-based learning process, where the learning process changes to a technology-based learning process, especially the internet. The use of Internet technology is known as IoT (*Internet of Things*) right Yes (*Internet of Everything*). The Industrial Revolution 4.0 also has an impact on people who are interacting, for example on interactions between teachers and students and between lecturers and students. Where interactions that are usually carried out face-to-face in the classroom have now changed and can be carried out virtually using various kinds of technology. Therefore, not only does the learning system change but the assessment tools must also change in technology-based assessments.

Every educator and prospective educator must have the ability to evaluate learning. Basically, learning assessment includes evaluation not only of learning outcomes but also of teacher and student actions during the learning process. Therefore, educational evaluation is very important and must be carried out carefully to find out whether the learning objectives have been achieved and whether the methods used have worked well.

So far, in the assessment process, teachers usually only use paper materials with questions from students' textbooks. So teachers always need more time in the correction and evaluation process because all these activities have to be done manually. The use of manual assessment materials by teachers is caused by several factors, one of which is the teacher's inability and understanding in developing computer-based assessment materials. This can cause teachers to not be able to make optimal use of the facilities and infrastructure available at school, both in the learning process and in assessment activities. The minimal use of technology in the assessment process can make it difficult for students to concentrate and lack interest, forcing them to focus on their own activities.

In circumstances like this, teachers need evaluation tools that can facilitate teachers' work, reduce the shortage of paper evaluations, create a pleasant learning environment, and increase student interest. One way to achieve this is by developing technology-based evaluation tools, such as the Wordwall.net site.

Wordwall.net is *website* which can be accessed by anyone, at any time, without time and place restrictions, and can be used free of charge (Fuad, 2020 p. 23). From research conducted by (Ihfanti Fidya et al. 2021 pp. 219-227) it is known that the use of interactive game media *Wordwall* in the learning process it has been proven to be effective in improving student learning outcomes and is able to arouse student interest and motivation in learning. because of the media's interest in interactive games. Apart from that, based on the research results, it was also concluded that multimedia games are interactive *Wordwall* can have a positive impact on teachers. *Wordwall* can be used as innovation for teachers by creating interesting interactive educational media that meets students' learning needs so that the learning process becomes more enjoyable. Based on the circumstances described above, the title of the article "Development of an Educational Game-Based Evaluation Instrument" can be formulated *Wordwall* "On Mathematics Subjects in Class IV SDN Laladon 02 Bogor Regency FY 2023/2024".

This research aims to determine the feasibility of a game-based evaluation tool *Wordwall* which is used in mathematics subjects in Class IV SDN Laladon 02 Bogor Regency.

Method

One type of research that is often used in education is the Research and Development method or *Research and Development* (R&D). Research and development is a scientific process for obtaining information that allows researchers to create, develop and test products. This research on the development of interactive learning media uses research and development research and development methods. This research and development method is a research method used to produce products and test the level of suitability of these products for learning activities. The development model approach used is the Borg & Gall model adapted from Sugiyono. However, this research only used 8 of the 10 stages because it was limited by researchers to meet ongoing research and development needs. The research stages used in this research include the following 8 stages: (1) Needs Analysis, (2) Data Collection, (3) Product Design, (4) Product Validation, (5) Product Improvement, (6) Small-scale trials, (7) Improve the product, (8) Test use. The research subjects consisted of 3 students from class IV *one to one evaluation*, 10-15 students in class IV were selected using small group assessment. Data collection was carried out using interview techniques, observation and distributing questionnaires to respondents, namely material experts, language experts and media experts. Furthermore, the types of data used in this research are qualitative and quantitative data (*mix method*) as the main data which will then provide an overview of the responses regarding the analysis carried out.

1. Analysis of Needs Based Evaluation Instruments *Wordwall*.

The initial step taken by researchers was observation activities to collect information. Observations were carried out to explore and identify the needs of students and teachers regarding assessment of fourth grade mathematics learning. In this activity, researchers distributed questionnaires to students and conducted interviews with mathematics teachers related to learning media. The instruments used for initial research were a questionnaire listing interview questions for class teachers and a questionnaire for students. The survey was given to grade 4 students at SDN Laladon 02 Bogor Regency to determine potential and problems using a student needs questionnaire. The results of interview findings from class teachers can be seen in the table below:

Table 1. Results of Teacher Needs Analysis

No.	Question	Of	No
1.	What evaluation do you use in paper-based Mathematics learning?	✓	
2.	Do you know about a website called <i>Wordwall</i> ?		✓
3.	Can the evaluation instrument you use attract students to work on the questions?	✓	
4.	Do you need a more practical evaluation instrument for students to work on questions?	✓	
5.	Do you agree if the evaluation is carried out using media? <i>Wordwall</i> ?	✓	

Based on the table above, teachers still use paper in learning assessment. The teacher then did not know about *Wordwall*. In addition, teachers need more useful media and teachers also agree to complete assessments using tools *Wordwall*. Meanwhile, analysis of student needs is based on assessment tools *Wordwall* can be seen in the following table:

Table 2. Results of Student Needs Analysis

No	Question	Of	No
1	Do you like Mathematics lessons?	✓	
2	Does the evaluation or presentation of Mathematics questions at your school still use paper/manual?	✓	
3	Does the implementation of Mathematics learning evaluation in your school utilize interactive media?		✓
4	Has your teacher ever given a Mathematics quiz using interactive media or something like that?		✓
5	Do you know? <i>Wordwall</i> ?		✓
6	Is the evaluation of Mathematics subjects carried out in accordance with the material presented?	✓	
7	Are the Mathematics subject evaluation questions presented easy to understand and interest you in working on the Mathematics questions presented?	✓	
8	Do you need other evaluation media to support evaluation activities?	✓	
9	Do you need a more interesting and fun evaluation media?	✓	
10	Do you agree if the evaluation or presentation of questions is carried out using <i>Wordwall</i> ?	✓	

Based on the table above, on average students like mathematics lessons, students stated that they still use paper/manual mathematics assessments. Apart from that, students stated that the Mathematics assessment did not have interactive media. Apart from that, students do not yet know about *Wordwall*. Apart from that, students also said that the mathematics assessment had been carried out according to the material submitted. Apart from that, students stated that the Mathematics assessment questions were easy to recognize and attracted students' interest in working on the questions asked. Then students stated that they needed other assessment tools to support their assessment activities. Apart from that, students need an interesting and fun evaluation tool and students agree if the evaluation or presentation of questions is carried out using it *Wordwall*.

2. Stages of Instrument Development

Instrument development was carried out through data collection which was carried out in several stages, namely by distributing feasibility questionnaires to validators who were experts in media, language, learning design and materials, while data collection on product creation was carried out by analyzing the learning tools used by teachers, namely in the form of teaching modules, analyzing questions. practice questions, as well as daily student assessments in Mathematics in class IV.

The curriculum used at SDN Laladon 02, Bogor Regency, in flat building material, is used as the basis for product design indicators for developing evaluation tools using the *Wordwall* application which can be accessed via the

website. The development of this evaluation tool was designed in accordance with development needs to achieve predetermined indicators that are in accordance with the curriculum used at SDN Laladon 02, Bogor Regency.

Table 3. Question Grid

Lesson Chapter	Question Indicator	Question Form	Cognitive Level	No. Question
Two-dimensional figure	Students are able to identify the characteristics of various flat shapes (sides and angles) in terms of many aspects accurately and correctly.	<i>Open the Box</i>	C1	1-18
	Students are able to arrange (compose) various flat shapes in more than one way (if possible) accurately and correctly.		C3	19 and 20

The questions used in this research were taken from the fourth grade Mathematics book and questions that had been used by the teacher in the previous semester which had not been used as an evaluation in fourth grade this year. The questions are taken based on the grid and also the learning objectives.

3. Instrument Design

Development of based evaluation instruments *Wordwall* includes analysis of the learning objectives of related Mathematics material then grouping questions according to the categories that will be presented in the quiz *Wordwall*. After reviewing and grouping evaluation questions, the next step is to create your initial quiz design on the site *Wordwall*. Quiz creation *Wordwall* This can be done by opening the website <https://wordwall.net/> After that an image will appear as follows:

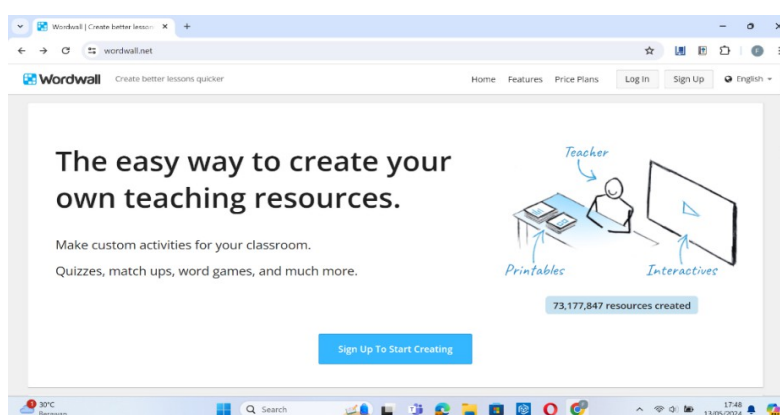
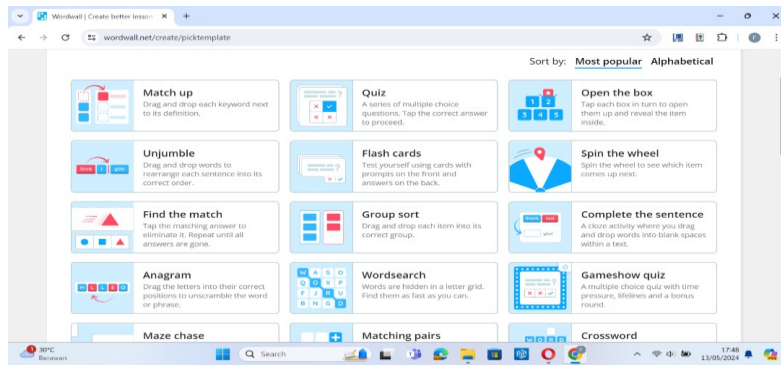


Figure 1. Initial Design Before Login

Before creating a quiz, users need to log in to the website which is in the top right corner of the screen. This login process is important so that the created quiz can be saved in the user's account, and can be edited and shared with students.

There are templates or types of quizzes that users can create at the bottom of the screen before logging in.



Picture 2. Types of Quizzes

Website *Wordwall* consists of many features used in evaluation, all of these features can be used for free and paid, can be adapted to the tests used by teachers. Apart from that, the features offered are also very interesting and fun to evaluate.

To carry out the login process, users only need to log in via a Google account or use the user's email in the registration column provided, then the user will immediately be directed to the website and can choose the type of question and create a question.

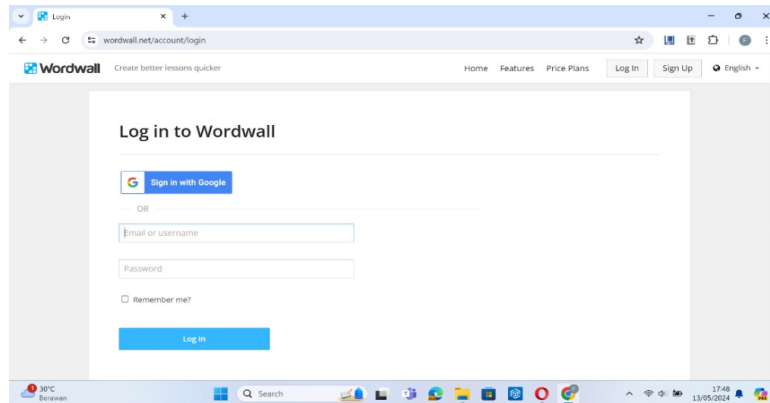


Figure 3. Display when logging in

After going through the login process, a display will appear as in the image below:

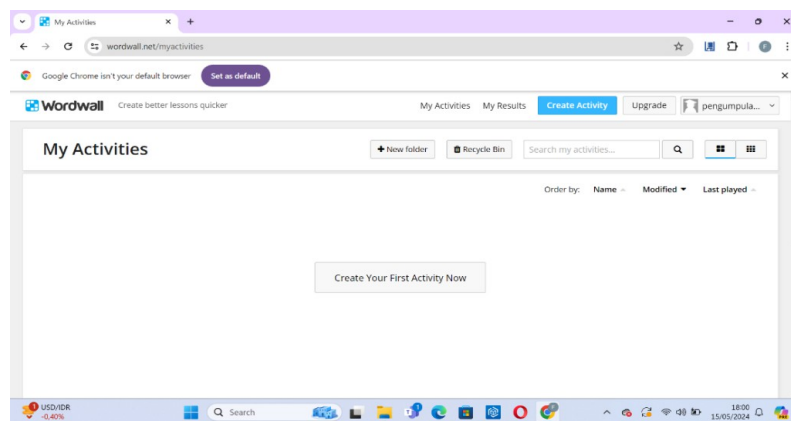
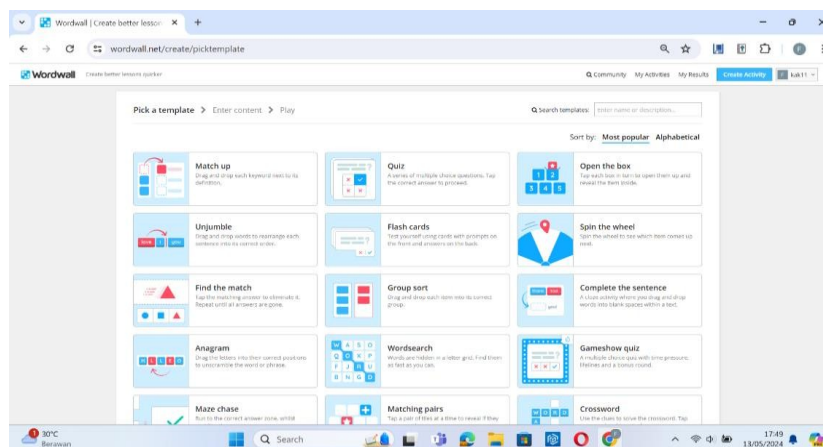


Figure 4. Display after logging in

From the image above, to start creating a quiz, users need to click *create activity*. After that, a display of various types of quizzes will appear that users can use to create questions.



Picture 5. Quiz Type Wordwall

This research uses evaluation categories available on the website *Wordwall* that is *Open the box* in the quiz type evaluation using 20 multiple choice questions *Open the box*.

Development of based assessment tools *Wordwall* designed with the type of quiz used for evaluation. Development of based evaluation instruments *Wordwall* This displays ICT-based questions (*Information and Communications Technologies*). The main requirement for this development is a reliable internet connection. The appearance on the website is regulated by *Wordwall*, so that researchers do not need to design the initial design of the site. Researchers can also set themes, time, randomization of questions, leaderboards on questions.

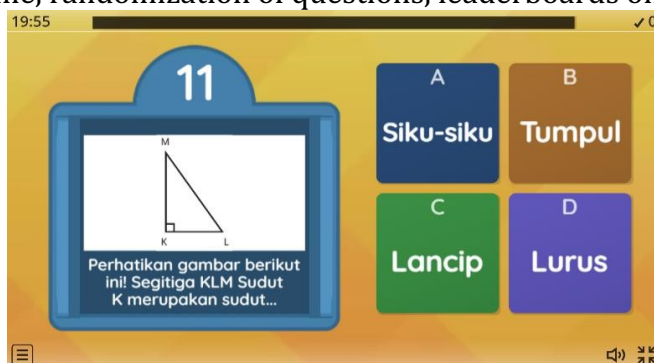


Figure 6. Question page display

4. Feasibility of Based Evaluation Instruments *Wordwall*

Product validation is carried out to test the validity of the evaluation-based instrument *Wordwall*, this validation was carried out by several experts, consisting of media, language, learning design and material validation experts. Product design validation was carried out by 4 validators from Ibn Khaldun University Bogor lecturers. The expert validators in this research are as shown in the following table:

Table 4. Validator Data

No.	Nama Validator	Expert Team	Institution
1.	Bambang Karyadi, S.T., M.Pd	Media Expert Validation	Ibn Khaldun University Bogor
2.	Alan Jaelani, S.S., M.Hum	Linguist Validation	Ibn Khaldun University Bogor
3.	Afif Ahmad Wiranata, M.Pd	Learning Design Expert Validation	Ibn Khaldun University Bogor
4.	Dr. Kurniati, M.Si	Material Expert Validation	Ibn Khaldun University Bogor

The media feasibility test was carried out by Mr Bambang Karyadi, S.T., M.Pd, one of the heads of the computer lab at the UIKA Bogor graduate school. This media feasibility test was carried out on March 19 2024. The following are the validation results by media experts:

Table 5. Media Expert Validation Results

No.	Aspect	Percentage
1.	Presentation	70%
2.	Content Design	68%
3.	Design	68%
4.	Ease of Use	80%
Average Percentage		71%
Criteria		Suitable for use without revisions

Data Source: Processed from the results of the Media expert validation assessment questionnaire

It can be seen in the table above, in the first stage of the feasibility test by media experts, a score with a percentage of 71% was obtained, so it can be concluded that the Wordwall educational game-based evaluation instrument can be declared "Feasible".

The linguist eligibility test was carried out by Mr. Alan Jaelani, S.S., M.Hum, one of the lecturers at the English Language Education Study Program, FKIP UIKA Bogor. The linguist eligibility test was carried out on March 6 2024. The following are the validation results by the linguist:

Table 6. Linguist Expert Validation Results

No.	Aspect	Percentage
1.	grains	80%
2.	Communicative	66,6%
3.	Suitability	80%
4.	EBI Rules	60%
Average Percentage		72%
Criteria		Worth using and needs to be revised

Data Source: Processed from the results of language expert validation assessment questionnaires

It can be seen in the table above, in the first stage of the feasibility test by a linguist, a score with a percentage of 72% was obtained. So it can be concluded that the educational game-based evaluation instrument *Wordwall* can be declared "Appropriate", but the product needs to be revised.

The feasibility test for learning design experts was carried out by Mr. Afif Ahmad Wiranata, M.Pd, one of the lecturers at the Educational Technology study program, FKIP UIKA Bogor. The feasibility test for this learning design expert was carried out on February 12 2024. The following are the validation results by the learning design expert:

Table 7. Validation Results of Learning Design Experts

No.	Aspect	Percentage
1.	Construction	85,7%
2.	Higher Order Thinking Skills (I mean)	95%
3.	Language	90%
Average Percentage		89,3
Criteria		Very suitable for use without revision

Data Source: Processed from the results of the validation assessment questionnaire from Learning Design experts

Based on the table above, you can see the results of the feasibility test scores by learning design experts, obtaining a score with a percentage of 89.3%. So it can be concluded that the evaluation instrument is based on educational games *Wordwall* can be declared "Very Eligible".

And finally, the material expert feasibility test was carried out by Mrs. Dr. Kurniati, M.Si, one of the lecturers at the Educational Technology study program, FKIP UIKA Bogor, as well as a lecturer in Mathematics. This material expert feasibility test was carried out on July 11 2024. The following are the validation results by material experts:

Table 8. Material Expert Validation Results

No.	Aspect	Percentage
1.	Presentation	86,6%
2.	Content Quality	96,6%
3.	Construction	93,3%
4.	Usage	100%
Average Percentage		92%
Criteria		Very unusable and needs to be revised

Data Source: Processed from the results of the Material Expert Validation Assessment Questionnaire

Based on the table above, you can see the results of the feasibility test scores by material experts, obtaining a score with a percentage of 92%. So it can be concluded that the evaluation instrument is based on educational games *Wordwall* can be declared "Very Eligible" but product revisions need to be carried out.

Interpretation results of the feasibility assessment of the web-based learning evaluation instrument *Wordwall* in class IV flat shape material, the following results were obtained.

Table 9. Interpretation of Expert Validation Questionnaire Assessment

Validator	Assessment Web-based learning evaluation instrument <i>Wordwall</i> as a whole
Members of the Media	Suitable for use without revision
Linguist	Worth using with revisions and suggestions
Learning Design Expert	Very suitable for use without revision
Materials Expert	Very Worth using with revisions and suggestions

The conclusion from the table above regarding the overall results of validation by media, language, learning design and materials experts shows an average percentage of 81.8% which meets the "Very Eligible" criteria for the web-based learning evaluation instrument *Wordwall* in class IV flat shape material. This can be explained in graphical form as follows.

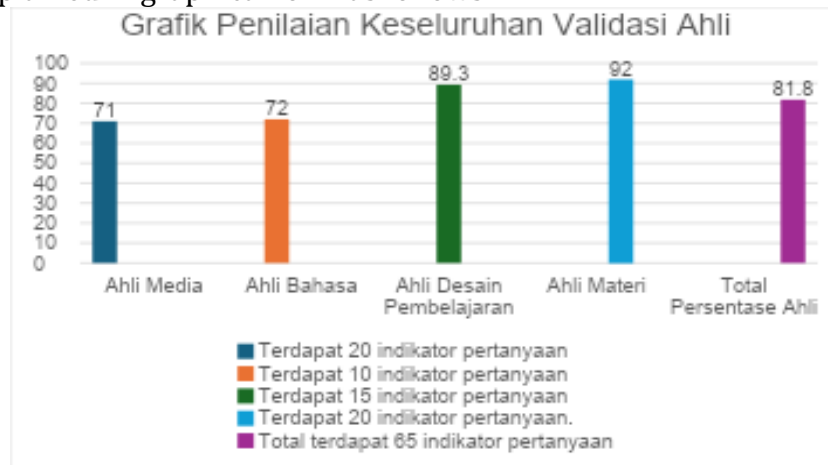


Figure 7. Diagram of Overall Expert Validation Assessment Results

5. Product Trial

a. Individual Trial (*One to One*)

After the product is validated by experts, researchers continue by conducting individual trials (*One to One*) on 3 class IV students at SDN Laladon 02. This trial was carried out using the data collection method by filling out a questionnaire. Filling out the questionnaire is done randomly *offline* by giving questionnaires to students. The results are presented in several categories, namely: (1) Attractiveness Aspects with 9 question indicators, (2) Content Quality Aspects with 3 question indicators, (3) Linguistic Aspects with 3 question indicators, and (4) Convenience Aspects with 5 question indicators.

After the individual trials have been carried out, the results are obtained based on the questionnaire that has been filled out by the students. The results of the questionnaire are presented in the following table:

Table 10. Individual Trial Questionnaire Results

No.	Assessment Aspects	Score	Percentage	Rate - Rate
1.	Aspects of Attractiveness	99	73,3%	3,66
2.	Content Quality Aspects	36	80%	4,0
3.	Linguistic Aspect	42	93%	4,66
4.	Convenience Aspects	68	90,6%	4,53
Total Total Value of Aspects		245		
Average Total of All Aspects		4,0		
Percentage of Overall Aspect		81,6%	Very Worth It	

Source: Processed from product trials

Based on the results of the questionnaire assessment, an overall score of 245 was obtained with a percentage of 81.6%, which is included in the "Very Decent" category. During the individual trials, no obstacles were found and students were very enthusiastic in participating in the learning evaluation process.

b. Small Group Trial (*Small Group*)

After carrying out the individual trial stage (*One to One*), the next stage is small group trials (*Small Group*). The small group trial involved 10 class IV students. The results are presented in several categories, namely: (1) Attractiveness Aspects with 9 question indicators, (2) Content Quality Aspects with 3 question indicators, (3) Linguistic Aspects with 3 question indicators, and (4) Convenience Aspects with 5 question indicators. The results of the questionnaire are presented in the following table:

Table 11. Small Group Trial Questionnaire Results

No.	Assessment Aspects	Score	Percentage	Rate - Rate
1.	Aspects of Attractiveness	340	34%	3,77
2.	Content Quality Aspects	122	81,3%	4,0
3.	Linguistic Aspect	133	88,6%	4,43
4.	Convenience Aspects	209	83,6%	4,18
Overall Total Value of Aspects		804		
Average Total of All Aspects		4,0		
Percentage of Overall Aspect		80,4%	Very Worth It	

Source: Processed from product trials

Based on the results of the questionnaire assessment, an overall score of 804 was obtained with a percentage of 80.4%, which is included in the "Decent" category. Students gave positive responses to the product, stating that the product helped them evaluate their learning and attracted students' interest.

The student response questionnaire in research data functions to obtain accurate data and information from respondents. The results of the student response questionnaire received a good response with an average score of 80.69%, this number is in the range of 61%-80% with the "Decent" criteria. Based on the results of the student questionnaire table data above, the following diagram can be presented.



Figure 8. Diagram of Overall Student Assessment Results

Based on the data above, it shows that the learning evaluation instrument is web-based *Wordwall* considered interesting, fun and easy to use, resulting in new innovations in the use of learning evaluation instruments, especially in the use of technology. Thus, the learning evaluation instrument is web-based *Wordwall* This is what is declared "Appropriate" for use on flat material.

Conclusion

Based on the results of research using flat building material evaluation tools *Wordwall* It can be concluded that the learning evaluation tool that has been developed was declared "very feasible" after a validation assessment was carried out by four experts with an assessment percentage of 81.8%. After the learning media product has been tested in individual trials (*one to one evaluation*) for 3 students to measure practicality, the results of the student response questionnaire assessment were obtained with a percentage of 81.6% so that it was stated that the learning media product was "very suitable" for use in learning evaluation. After the learning media product is tested in small groups (*small group*) for 10 students, the results of the student response questionnaire assessment were obtained with a percentage of 80.4%, so it was stated that the learning media product was "fit" to be used in learning evaluation. Furthermore, the average assessment of the overall student assessment results was obtained with a percentage of 80.69%. The evaluation tool uses an application *Wordwall* It is hoped that this can be applied to other subjects, so that it can help with practicality when implementing learning evaluations in schools. The suggestions that the researcher conveys regarding the research results are: 1) In developing website-based interactive learning media, researchers are required to determine the material and learning that will be discussed, determine in advance the prerequisite abilities such as internet network access in the school environment and *smartphone* used by students; 2) Researchers hope that educators, in this case mathematics educators in schools, will be able to apply learning evaluation tools using applications *Wordwall* well as an effort to support evaluation activities for grade IV elementary school mathematics learning on plane figures; 3) In this research, the mathematics learning evaluation tool uses an application *Wordwall* only used in class IV at SDN Laladon 02 Bogor Regency. Therefore, other researchers can develop further/similarly on a wide scale; 4) Development of learning evaluation tools using websites *Wordwall* when learning mathematics only focuses on material about flat figures, it is hoped that there will be the development of similar mathematics evaluation tools but with different material; 5) Product development of assisted assessment instruments *Wordwall* This is only limited to using assistance *Wordwall*. Therefore, it needs to be developed using different alternatives, such as with the help of other similar applications or websites; 6) Product development of assisted assessment instruments *Wordwall* uses the Borg and Gall model development model in its development process based on the curriculum which is also valid at this time. So that in further development we can apply other development models and also continue to follow the curriculum. 7) Media developed with web applications *Wordwall* It provides a variety of varied templates so that they can be developed according to user needs or used in other subjects by selecting appropriate learning content. In its development, this is very practical for developers who do not understand technology-based media development because designing media does not require coding. Then the use of this media is easy to apply for class IV students. So it's an educational game *Wordwall* This can be applied to students at the same or higher grade level.

References

- Fidya, I., Romdanih, & Oktaviana, E. (2021). Improving Social Studies Learning Outcomes Through Wordwall Interactive Game Media. *Proceedings of the National STKIP Kusuma Negara Education Seminar III*, 219–227.
- Fuad, N. (2021). *Application of online learning media based on educational games in improving the mathematical communication skills of class VI A students at SD Darul Ulum Bungurasih Waru Sidoarjo* [Sunan Ampel State Islamic University Surabaya]. <https://digilib.uinsa.ac.id/45882/>
- Lubis, S. B. (2024). Development of an Evaluation Instrument Based on Wordwall Educational Games on Theme 6 Subtheme 2 in Class IV SDN 066664 Medan T.A 2022/2023. *IJEB: Indonesian Journal Education Basic*, 2(1).
- Simarmata, J., Hamid, M. A., Ramadhani, R., Chamidah, D., Simanihuruk, L., Napitupulu, M. S. D., Iqbal, M., & Salim, N. A. (2020). *Education in the Era of Revolution 4.0: Demands, Competencies and Challenges*. We Write.
- Sugiyono. (2023). *Quantitative, Qualitative, and R&D Research Methods* (Sutopo, Ed.). ALPHABET.