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Development of wordwall-based learning media in mathematics subjects on spatial figures for fourth grade students at SDN 1 Cempaka

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ABSTRACT

Development of word wall-based learning media in mathematics subject spatial building materials grade IV elementary school with the aim of knowing the procedures for making products and the level of validity and practicality of the media products that have been developed. This research uses the Research and Development (R&D) method with the ADDIE (Analysis, Design, Development Implementation, and Evaluation). Data collection techniques included interviews, documentation, validation sheets, and questionnaires. The assessment results from material experts were 3.66 (very valid), the assessment results from media experts were 3.66 (very valid), and the assessment results from class teacher practitioners were 3.70 (very valid). Practicality was carried out with a total of 11 grade IV students an average score of 94% was obtained, which was classified as "very practical". From these results word wall-based learning media in mathematics subject spatial building materials is suitable for use in delivering material in the teaching and learning process in schools.

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INTRODUCTION

Education is defined as a process with certain methods, so that people gain knowledge, understanding and ways of behaving that suit their needs (Diana & Mesiono, 2016). Education has a role to grow and develop the potential that already exists in each individual through teaching and learning activities. Student learning outcomes are one of the measuring tools to see how far students have mastered the subject matter that has been delivered by the teacher (Wirda et al., 2020). As time goes by humans are encouraged to be more creative in developing or implementing education as a basic science, one of which is mathematics.

In elementary school, mathematics is a compulsory subject. Mathematics is one of the subjects that is not liked by most children, mathematics learning in elementary school

is not only oriented towards understanding the material, but students are expected to be able to master the material easily. According to Dienes, he emphasized that every mathematical concept or principle should first be presented in a concrete form so that it can be perfectly understood by students, so it is very important to manipulate objects in learning mathematics. Teachers can provide experiences by utilizing learning media that can bridge mathematical concepts to become more concrete. In mathematics learning, teacher mastery of the material and use of media has an important role in creating contextual learning for students (Wahyu Ningtia & Rahmawati, 2022).

One way to improve students' mathematical understanding is by presenting interesting learning media. With the help of learning media, it is believed that learning will be more interesting, so that the material presented can be easily understood by students. According to Hartati et al. (2018), one of the interesting learning media to develop is website-based media. This is in accordance with the characteristics of students who have the ability to operate gadget devices and are accustomed to internet access. Along with the development of technology, learning can be assisted by applications or website-based learning media that are interactive and attract students' interest (Fikri, 2019).

With the increasingly rapid development of technology in this era, it is possible that the use of technology-based evaluation tools, especially information and communication technology, can be applied and have a positive impact in the world of education (Irmayanti et al., 2022). One solution to this problem is to develop wordwall media. Wordwall media is an interactive media with various interesting features and quizzes (Salsabila & Tsurayya, 2024). Wordwall media is a collection of vocabulary that is systematically organized and displayed in large letters and displayed on the wall of a classroom (Anugrah et al., 2022). Wordwall is a learning medium that should be used, not just displayed or viewed. This media can be designed to enhance learning activities and can also involve students in its creation (Andriany & Warsiman, 2023). Wordwall media is a web application that can be used to create fun education for students and can also be used as a learning medium that can make students active. Through wordwall media, it will be easier for students to understand their mathematics learning abilities and be more active in the learning process so that students can develop their talents optimally (Sudarsono & Mulyani, 2021).

Wordwall was chosen because it has many advantages, including many types of games that can be used, such as quizzes, crosswords, find the match, random wheels, true or false and so on. There is also a learning evaluation feature in the form of a leaderboard and can see the errors of each question worked on by students, and there is a percentage value to find out the most difficult questions to the easiest questions. In addition, games that have been created can be sent directly via WhatsApp, Google Classroom, or others. (Fikri, 2019; Gandasari & Pramudiani, 2021; Setiawan & Andrianto, 2024). Furthermore, Maghfiroh's opinion (2018) explains that the use of wordwall media in grade IV can improve mathematics learning outcomes for spatial geometry material. Because with media that displays learning materials, it can be viewed at any time and creates an unintentional learning process.

(Gandasari & Pramudiani, 2021) stated that the influence of the wordwall application gave a significant reaction in understanding the learning material. The research conducted showed that learning media had an effect on students' learning motivation. This research is supported by Wahyu Ningtia & Rahmawati (2022) which states that the use of wordwall media can provide a large distribution in thematic learning

in class II, especially on interests and provide learning motivation in students. This means that this wordwall learning media has advantages in fostering students' interest and passion for learning.

Research has been conducted in implementing interactive learning media for teaching and learning activities. Research conducted by Susilo Sudarsono and Mulyani entitled "Development of Interactive Game Learning Media Based on Wordwall Web Applications in Mathematics Lessons on Odd-Even Numbers for Grade II Elementary School" in 2021 (Sudarsono & Mulyani, 2021). To find out the development of interactive game learning media based on wordwall web applications in mathematics lessons on the concept of odd-even numbers. Research conducted by Muhammad Nurul Fikri with the title "Development of Online Web-Based Hypermedia on the Concept of Circulation Systems" in 2019 (Fikri, 2019). To determine the validity of web-based hypermedia wordwall as an alternative learning media that is suitable for use in mathematics learning. Research conducted by Modi Wahyu Ningtia and Ika Rahmawati with the title "Development of Web-Based Learning Media Wordwall Application in Mathematics Learning for Grade II Elementary School Currency Fraction Equivalence Material" in 2022 (Wahyu Ningtia & Rahmawati, 2022). To find out the development process and feasibility of interactive game learning media based on web word wall applications in learning mathematics on the subject of currency fractional equivalence.

Based on the results of interviews conducted by researchers with the homeroom teacher of class IV as the teacher of mathematics at SDN 1 Cempaka, the learning currently being implemented is in accordance with the independent curriculum. The interview results showed that students had difficulty in understanding and working on math problems, especially in the chapter on blocks and cubes. This problem was caused because the teaching materials used in learning were only math textbooks. This makes students feel less interested in reading and results in students not understanding the material and concepts being taught. In addition to teaching materials, teachers get references for learning media from the surrounding environment, the internet and friends. This is caused by the lack of motivation and interest of students in learning mathematics. Therefore, learning media is needed in every mathematics learning activity, especially in the material on blocks and cubes.

Therefore, the development of this learning media will be focused on wordwall-based media. Wordwall can lead students to know how to build a space. Learning this space can be modified with wordwall-based learning media and integrated with google sites. So that by using this website-based learning media, it can attract students' attention. Based on the description, a research concept was prepared with the title "Development of Wordwall-Based Learning Media in Mathematics Subjects on Spatial Structures for Class IV SDN 1 Cempaka".

METHOD

The research was conducted using development research. development research is Research & Development (R&D) (Latifah et al., 2015) states that Research & Development (R&D) is an approach in research to obtain new work or confirm work. Researchers use the ADDIE development model which has five stages, namely (Rayanto & Sugianti, 2020:30): Analysis, Design, Development, Implementation and Evaluation. In the product that will be developed by the researcher in the form of Word Wall-Based Learning Media in Mathematics Subjects, Grade IV Spatial Building Material. The reason researchers use the ADDIE model in the research to be conducted is because this

development model uses practical steps and is easy for researchers to understand and when applied is still within the desired goals. Then each step of improvement in development is still within the realm of the previous step until the product being developed gets validation and is suitable for use.

In this study, the subjects were students of grade IV of SDN 1 Cempaka. The researcher chose this class because it was considered that they already had more knowledge about technology, and were wiser in using technology-based learning media in learning activities. In addition, the researcher also found it easier to interact with the fourth-grade teachers to ask for information related to the implementation of learning that was carried out as one of the foundations behind the research. The total number of fourth grade students was eleven people as respondents in the product trial.

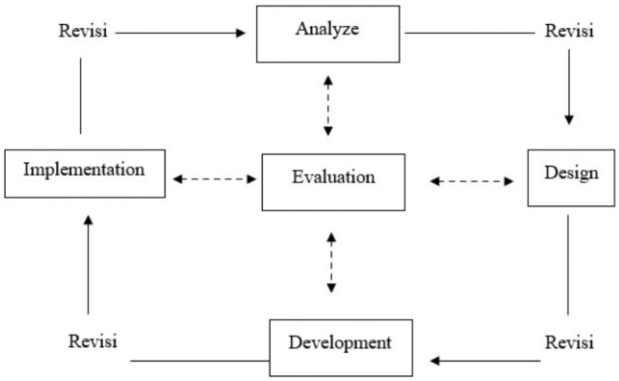

Figure 1. Stages of the ADDIE Development Model

Data collection techniques are carried out to support the feasibility of the product to be developed by the researcher. In this study, data collection consists of interviews, questionnaires and documentation. Interviews were conducted by researchers at SDN 1 Cempaka with one of the representatives of grade IV teachers named Mrs. Yuliani, S.Pd. related to the material discussed in the study, the needs of students, and so on before the study was conducted. In this study, the researcher chose Mrs. Dr. Ruri Tria Astika, M.Pd. as the material expert validator because she is one of the lecturers in mathematics at the PGSD study program at Sriwijaya University, whom the researcher considers competent in her field. Then, the media expert validator, the researcher chose Mrs. Dr. Erna Retna Safitri, M.Pd. because she is one of the lecturers in media and learning technology at the PGSD study program at Sriwijaya University, whom the researcher considers competent in her field. Meanwhile, the validation of class teacher practitioners was carried out by Mrs. Yuliani, S.Pd. as a class IV teacher at SDN 1 Cempaka.

The results of the validation sheet by the validator were analyzed descriptively as input for revising the wordwall-based learning media product for spatial geometry material. Suggestions or input from the validator were written on a Likert scale validation sheet that has 4 answer categories, including very good, good, not good, very bad (Sugiyono, 2019). The Likert scale is a scale used to measure the perception, attitude or opinion of a person or group regarding an event which is generally applied in questionnaires and research in the form of descriptive survey research (Yusup, 2018).

Table 1. Validation Answer Categories

Answer Categories	Answer Score
Very good	4
Good	3
Not good	2
Very bad	1

After the average value with the following formula:

$$\mathbf{X} = \frac{\Sigma X}{N} \times 4$$

Information:
X : Average value
ΣX : Total amount of data
N : Lots of data (Sundari, 2022:36)

From the formula above, the percentage of values or scores obtained from the experts will be obtained. Furthermore, the final score obtained is adjusted to the validation and feasibility criteria table (Arigiyati et al., 2018). The following is a table of categories of the level of validity of interactive learning media based on the values given by the validators.

Table 2. Validity Level Categories

Average Value Range	Validity Category
X ≥ 3,00	Very Valid
3,00 ≥ X ≥ 2,5	Valid
2,5 > X ≥ 1,75	Invalid
1,75 > X	Totally Invalid

(Faresta & Kosim, 2020)

Questionnaire Data Analysis

The questionnaire data was filled out by eleven students. The following are the answer value categories as shown in the Table 3.

Table 3. Categories of Student Trial Questionnaire Answer Values

Answer Categories	Answer Score
Yes	1
No	0

The questionnaire was used to determine the responses of educators and students to the learning media developed by researchers. The questionnaire contains questions that must be answered by educators and students to determine the attractiveness of the learning media used. The student response questionnaire is given a score on each item with the answers Yes and No. If the student answers Yes then the score is 1, If the student answers No then the score is 0.

$$\text{Percentage Value} = \frac{\text{score}}{\text{maximum score}} \times 100\%$$

The percentage value will indicate the category of practicality of using learning media, which is categorized according to the provisions in the following table:

Table 4. Categories of Student Response Questionnaire Results Values

Mark (%)	Value Category
81 – 100	Very Practical
61 – 80	Practical
41 – 60	Quite Practical
21 – 40	Not Practical
0 – 20	Very Impractical

(Sundari, 2022)

The development of wordwall-based media is said to be practical if the value obtained is more than 61% and vice versa, the development of wordwall-based media is less or not practical if the value obtained is below 61%.

RESULTS AND DISCUSSION

Result

This study produces a product in the form of learning media that focuses on the concept of spatial figures (cubes and cuboids) for grade IV Elementary School students.

This learning media is created using the wordwall platform and integrated with Google Sites. In the use of learning media for spatial figures, SDN 1 Cempaka has not used technology-based media but has used conventional media. Therefore, this study creates a learning media using technology, namely interactive learning media based on wordwalls for grade IV spatial figures. The researcher uses the 5-stage ADDIE model, namely Analysis, Design, Development, Implementation, and Evaluation.

Analysis

The analysis stage is the earliest stage in starting a research on the ADDIE development model. At this stage, the activities carried out by researchers include:

Student Needs Analysis

At the stage of student needs, researchers conducted observations by observing the rooms in the school, student behavior and conducting interviews with grade 4 teachers. After conducting an interview with the homeroom teacher of class IV, namely Mrs. Yuliani, S.Pd. as the respondent. The researcher obtained information that the use of learning media is still not applied enough in the teaching and learning process. The following are questions and answers that have been implemented.

Table 5. Questions and Answers

No	Researcher Questions	Respondents' Answers
1.	What methods do you apply during the learning process?	During the learning activities I use several methods, namely lecture methods, discussions, questions and answers, and assignments. Sometimes students seem unenthusiastic in learning because they do not use learning media and the facilities at school are inadequate if they want to use learning media.
2.	Have you ever had difficulty in delivering material, especially in Mathematics, on spatial geometry?	When I deliver the material, sometimes students are difficult to manage and have difficulty in conditioning the students' conditions. Because I rarely use learning media, sometimes I only use picture media, this has an impact on the lack of understanding of the students' material.
3.	During learning activities, do you use additional media during learning?	Yes, I use media directly, such as when studying spatial structures, I use objects around me that can be additional media and also printed images.
4.	How do students respond when using learning media?	Students are more enthusiastic in learning when I use learning media.
5.	Has the school previously developed word wall-based learning media?	Never before, the school has never used word wall-based learning media.

Based on Table 5, the interview results can be interpreted that in the teaching and learning activities, educators apply a lecture system, questions and answers, discussions, and assignments. Then, in learning, teachers only use simple media such as using printed media and books. This is due to the lack of school facilities such as projectors and also the teacher's understanding of utilizing technology due to age factors. When carrying out Mathematics learning on spatial geometry material, teachers use concrete media that are around them only, to accommodate students in studying the subject. However, in spatial geometry material, it would be better if additional media were presented such as technology that can be accessed directly by students and can present material widely accompanied by pictures and interesting features according to student understanding. In addition, students will be more enthusiastic and gain an understanding of spatial geometry material. This causes researchers to want to develop learning media that can be directly accessed easily by students. In addition, researchers also hope that agencies and educators

can have enthusiasm to develop similar learning media. It can be stated that the use of interactive learning media during teaching and learning activities in class can make students more enthusiastic during learning and not cause students to get bored quickly in the learning process in class.

Curriculum Analysis

SDN 1 Cempaka has used the Merdeka Curriculum in the learning process. Adjustment of the content of materials, books and sources based on the guidelines of the curriculum used.

Design

After completing the analysis stage, the researcher then carries out activities which include.

a. Choose the Platform

The process of selecting a platform to develop learning media is carried out with the aim that researchers can adjust the needs, abilities, and characteristics of students. Researchers focus on the use of Wordwall and integrated with Google Sites as a tool used in the process of creating a website used as a learning media. The Wordwall platform and integrated with Google Sites helps researchers in packaging teaching materials, collections of questions, discussion forums, assignment collections and learning conclusions in an interactive media that can be used by students in learning activities. Google Sites has features consisting of insert menus, pages, themes, links, collapsible groups, integration, and feedback that researchers can create according to the needs related to the elements that researchers want to emphasize in the website learning media being developed. In addition, the final product of the learning media developed with the Wordwall platform and integrated with Google Sites is in the form of a link so that it can be accessed by students through subject groups, and saves memory storage for teachers and students because it is directly stored in the user's email.

b. Selection of Learning Materials

The activity of selecting subject matter is carried out with the aim of focusing on the subject matter that will be used by researchers to develop Wordwall-based website learning media. In this study, researchers focused on Mathematics subjects with the subject of spatial shapes. Based on information obtained by researchers, the curriculum used in grade IV at SD Negeri 1 Cempaka is the independent curriculum. Then at this stage, researchers have also compiled a teaching module as a reference for researchers at the stage of testing learning media, the teaching module can be seen in the appendix.

Development

The development stage is carried out by referring to the design that has been carried out by the researcher in the previous stage. The researcher will make a product using the materials that have been determined and at the same time collect them according to the stages of product production that have been prepared by the researcher. The materials that are poured into this website learning media use the help of several other platforms that are connected and then displayed in the form of shortcuts so that they can be fully accessed directly by users of the wordwall learning media. The main platforms used by researchers include wordwall and supporting platforms such as Google Sites, Canva, and Youtube. Furthermore, after the product is in prototype form, the wordwall-based website learning media product will be validated by expert media and material expert validators based on the research validation instruments that have been designed. In the end, the

product will go through a revision activity according to the suggestions and criticisms given by the validator.

Development of Learning Media

The learning media development activity in this step aims to find out the process of learning media development from the design stage by making a prototype storyboard. The prototype storyboard is a table of product development results made according to the storyboard layout at the design stage. In this step, the researcher uses the wordwall website and integrates it with Google Sites during the development process that will produce a wordwall-based learning media product. The following is a prototype storyboard that has been made by the researcher.

Tabel 6. Storyboard Prototype

Stages	Visual	Information
Home page		The homepage is the main display of this website media. on this page there is a media logo, the logo of Sriwijaya University. At the bottom there is a description of each menu that can be accessed on this learning media including home, learning objectives, materials, and games.
Learning objectives		On this page, you will find out the learning objectives that students will learn at that time.
Material		This page contains introductory learning videos that are directly linked to YouTube so that students can go straight to the learning video.

Stages	Visual	Information
Evaluation (Game)		On this page there are several games available as game-based learning media for students.

Validation by Material Experts, Media Experts and Classroom Teacher Practitioners

Validation by experts was conducted from October to November 2024. The interactive learning media products developed by researchers will be revised according to the suggestions/input provided by experts. The following are details of the results of validation by experts on wordwall-based learning media. The results of the assessment of the material validation are shown in the following Table 7.

Table 7. Results of Material Expert Validation Assessment

No	Evaluation Aspects	Total Score	Maximum Score	Average Value	Category
1	Curriculum	16	16	4,00	Very Valid
2	Material	16	16	4,00	Very Valid
3	Language	12	16	3,00	Very Valid
Amount		**44**	**48**	**3,66**	**Very Valid**

Based on Table 7, the validation of material experts on the Wordwall-Based Learning Media product has three assessment aspects, namely the curriculum, material, and language assessment aspects. The average value obtained from the validation of material experts is 3.66 with a very valid category. The material expert lecturer concluded that the Wordwall-Based Learning Media product, especially in grade 4 of elementary school that has been developed by researchers, can be tested with revisions according to suggestions. The results of the media validation assessment are shown in the following Table 8.

Table 8. Results of Media Expert Validation Assessment

No	Evaluation Aspects	Total Score	Skor Maksimal	Average Value	Category
1	Symbol System	21	24	3,50	Very Valid
2	Technology Perspective	8	8	4,00	Very Valid
3	Processing Capability	7	8	3,50	Very Valid
Amount		**36**	**40**	**3,66**	**Very Valid**

Based on Table 8, media expert validation of Wordwall-Based Learning Media products has three assessment aspects, namely the symbol system assessment aspect, technology perspective, and processing capability. The average value obtained from media expert validation is 3.66 with a very valid category. Media expert lecturers concluded that Wordwall-Based Learning Media products, especially in grade 4 of elementary school that have been developed by researchers, can be tested with revisions

according to suggestions. The results of the assessment of the material validation are shown in the following Table 9.

Table 9. Results of Classroom Teacher Practitioner Assessment

Evaluation Aspects	Total Score	Skor Maksimal	Average Value	Category
Content Eligibility	14	16	3,50	Very Valid
Characteristics	20	20	4,00	Very Valid
Linguistics	7	8	3,50	Very Valid
Material	8	8	4,00	Very Valid
Media	21	24	3,50	Very Valid
Amount	**70**	**76**	**3,70**	**Very Valid**

Based on Table 9, media expert validation of wordwall-based learning media products has five assessment aspects, namely the feasibility of content, characteristics, language, materials and media. The average value obtained from media expert validation is 3.70 with a very valid category. Classroom teacher practitioners concluded that Wordwall-Based Learning Media products, especially in grade 4 of elementary school that have been developed by researchers, can be tested with revisions according to suggestions.

Implementation

The implementation stage was carried out on December 9-30, 2024 for grade IV students of SDN 1 Cempaka located in Cempaka Village, Cempaka District, East OKU Regency, South Sumatra Province. The implementation stage was carried out after the wordwall-based learning media product had been revised and validated by experts.

Student Trial

The next stage is a product trial after validation by expert lecturers and educators as well as revision of learning media by researchers. This product trial is to see the attractiveness of the learning media developed by researchers to 11 students and educators in grade IV. When the product trial is to be carried out, students are given directions to remain orderly. At the beginning of the activity, students pray, then ask how the students are, after that the researcher displays the learning media to students and students are asked to observe the learning media, the researcher directs students to fill out the questionnaire guided by the researcher. The following are the results of the number of respondents filling out the student questionnaire and the results of the responses of grade IV students.

The results of the questionnaire assessment from the student trial of the wordwall-based learning media product are shown in the following Table 10.

Table 10. Questionnaire Assessment Results

No	Question	Total Score	Persentase	Category
1.	For me, the images presented in word wall-based learning media are easy to understand.	11	100%	Very Practical
2.	For me, the writing on the word wall-based learning media is very clear.	11	100%	Very Practical
3.	I am interested in the appearance of word wall-based learning media.	10	90%	Very Practical
4.	I feel that the language used in word wall-based learning media is easy to understand.	10	90%	Very Practical
5.	I am happy when using word wall-based learning media	9	81%	Very Practical

No	Question	Total Score	Persentase	Category
6.	For me, word wall-based learning media is interesting.	11	100%	Very Practical
7.	I am excited and motivated to learn how to use word wall-based learning media.	11	100%	Very Practical
8.	I feel like I want to continue using word wall-based learning media.	11	100%	Very Practical
9.	I understand the material on cube and cuboid geometry Signature presented in the word wall-based learning media	11	100%	Very Practical
10.	For me, word wall-based learning media can help develop learning abilities.	9	81%	Very Practical
	Amount	**104**	**94%**	**Very Practical**

Based on Table 10, the 3rd assessment aspect has 10 students answering "YES" with a percentage of 90% and the category "Very Practical". The 4th assessment aspect has 10 students answering "YES" with a percentage of 90% and the category "Very Practical". The 5th assessment aspect has 9 students answering "YES" with a percentage of 81% and the category "Very Practical". The 10th assessment aspect has 9 students answering "YES" with a percentage of 81% and the category "Very Practical". In the 1st, 2nd, 6th, 7th, 8th, 9th assessment aspects all students answered "YES" with a percentage of 100% and the category "Very Practical". The value of 94% with the very practical category is the result of the practicality assessment from the student response questionnaire.

Validity and Practicality of Using Learning Media

Validation of Learning Media

Validity can be known from the validation results by experts, namely material experts, media experts and classroom teacher practitioners. The following is a description of the validation results.

Table 11. Summary Results of Learning Media Validation

No	Validation	Average Value	Value Category
1.	Subject Matter Expert	3,66	Very Valid
2.	Media Member	3,66	Very Valid
3.	Practitioner Teacher Expert	3,70	Very Valid

Based on Table 11, the recapitulation of the validation of material experts is 3.66 with a very valid category, media experts are 3.66 with a very valid category and class teacher practitioners are 3.70 with a very valid category. This shows that the Wordwall-Based Learning Media product in Mathematics Subjects for Grade IV Spatial Building Materials that has been developed by researchers has a very valid level of validity.

Practicality of Using Learning Media

The practicality of using interactive learning media can be seen from the results of the student trial questionnaire. The following is a description of the results of the student trial questionnaire.

Table 12. Summary of Student Trial Questionnaire Assessment Results

No	Questionnaire Results	Total Score	Maximum Score	Mark	Category
1.	Student Trial	104	110	94%	Very Practical
	Amount	104	110	94%	Very Practical

Evaluation

This step is the final step in the ADDIE type development research. This stage aims to measure the feasibility of the media that has been assessed by the media expert

validator and material expert before conducting the trial. To find out the feasibility of the learning media, the researcher used a response questionnaire sheet given to the fourth grade teacher and eleven fourth grade students. Before the researcher conducted the trial stage, the researcher first improved the learning media product that was developed based on the direction and input from the material expert validator and the media expert validator. The material expert validator gave advice in the form of in the material section, it is better to first explain examples of cubes and blocks in everyday life, after that, then enter the definition of cubes and blocks. Meanwhile, the media expert validator gave advice in adding learning objectives that should be described in detail.

At the implementation stage of the trial on the fourth grade homeroom teacher, the homeroom teacher gave a response of "Very Valid" with an average value of 3.70 resulting from the teacher response questionnaire sheet. The homeroom teacher gave a response saying that the media created was suitable for use in learning. In the student trial, the researcher used eleven respondents and obtained a score of 94% in the "very practical" category.

DISCUSSION

The development of website learning media based on wordwall was developed by researchers by referring to the needs of students, teachers and schools. This was done in order to increase the activeness, motivation, and learning outcomes of students. This is the basis for researchers to develop website learning media based on wordwall in mathematics subjects for grade IV spatial geometry at SDN 1 Cempaka. Researchers use the ADDIE development model which consists of 5 stages, namely Analysis, Design, Development, Implementation, and Evaluation. (Sugiyono, 2019).

The initial stage carried out by the researcher is the Analysis stage, this activity is carried out by conducting interviews with the homeroom teacher IV, namely Mrs. Yuliani, S.Pd at SD Negeri 1 Cempaka which was carried out in August 2024. From the interview activities conducted by the researcher, it was found that the use of learning media is still very minimal and is still fixated on textbooks as the main learning source without other support such as learning media. Teachers carry out more learning activities using lecture and assignment methods. Based on this, the researcher can conclude that monotonous learning results in a sense of boredom and a lack of student activity. This causes a sense of boredom and boredom in students.

The next stage is the design stage. The researcher chose the wordwall platform integrated with Google Sites as a tool used to develop learning media. Another thing that must be designed is the material, the researcher chose the Mathematics subject with a focus on spatial geometry (cubes and blocks). The creation of learning media must be accompanied by a concept that is carefully prepared, therefore the next stage is to design the framework of learning media in the form of flowcharts and storyboards. This stage is carried out by the researcher in accordance with the research conducted by (Anderson, 2023) that to create a learning equipped with learning media, a learning media framework design is needed. Development requires good assessment by validators, practitioners (teachers), and students so that researchers design validation instruments consisting of material experts and media experts as well as response questionnaires that will be filled out by teachers and students after conducting trial activities.

The stage carried out after carrying out the design activity is the Development stage. This stage is carried out to realize the design that has been made by the researcher in the previous stage. Media development is carried out in stages according to the procedure for

creating a website using the wordwall platform. Furthermore, when the wordwall-based website learning media has been developed according to the design, the researcher will carry out validation activities carried out by the validator who is appointed and approved as an assessor of the learning media developed by the researcher both in terms of material or media appearance. This is in line with research conducted by (Sudarsono & Mulyani, 2021) that before being tested, researchers must first go through a validation stage to assess the feasibility of the learning media before actually going into the field to be tested in actual learning. Each validator will assess the product being developed. The assessment is carried out by providing an assessment instrument followed by a column of criticism and suggestions that will be used as a guideline in carrying out product revision activities. The average result obtained by researchers after validating the material expert validator was 3.66 or categorized as "Very Valid", the assessment given by the media expert validator was 3.66 or categorized as "Very Valid" and the assessment given by the class teacher practitioner expert validator was 3.70 or categorized as "Very Valid".

The product that has been validated and revised by the researcher will enter the Implementation stage. At this stage, the researcher conducted a trial process on teachers, namely the homeroom teacher of class IV, and eleven students of class IV. SD Negeri 1 Cempaka. The results obtained from the teacher's assessment got an average score of 3.70 or included in the "Very Good" category. Furthermore, for the average assessment of the student response questionnaire, a score of 94% was obtained with the "Very Good" category. The results of this study are relevant to the research conducted by Susilo Sudarsono and Mulyani entitled "Development of Interactive Game Learning Media Based on Wordwall Web Applications in Mathematics Lessons on Odd Even Numbers for Class II Elementary School" in 2021 (Sudarsono & Mulyani, 2021). The results of the interactive game research based on the wordwall web application that was developed obtained decent results from media experts with a percentage of questionnaire scores from students getting a percentage of 90% which is included in the "practical" category. From the explanation described, it can be seen that the researcher obtained a superior assessment when compared to previous research, namely research conducted by Susilo Sudarsono and Mulyani. In addition, this is also in accordance with research conducted by Modi Wahyu Ningtia and Ika Rahmawati entitled "Development of Web-Based Learning Media Wordwall Applications in Mathematics Learning for Grade II Elementary School Currency Fraction Equivalence Material" in 2022 (Wahyu Ningtia & Rahmawati, 2022). The results of the study indicate that the use of interactive web-based games wordwall applications is very feasible to be used as a tool in learning mathematics with a percentage score of 86.09%. Referring to this, researchers can interpret that the development of website learning media based on wordwall is able to provide a good response and in accordance with needs so that it can be said to be feasible to be used in the learning process.

The final stage in the development model chosen by the researcher is Evaluation. Evaluation has been carried out by the researcher from the development stage where the researcher conducted validation activities to expert media and material validators to assess the validity of the product developed by the researcher before it was actually tested on teachers and students in the field. The validation activities carried out resulted in criticism and suggestions that were used as guidelines by the researcher to improve the learning media developed. After that, evaluation was also conducted at the implementation stage where the trial was conducted on one homeroom teacher and eleven fourth grade students of SD Negeri 1 Cempaka, at this stage the researcher provided

learning media to be studied and assessed by the teacher according to the instrument made by the researcher. Furthermore, the researcher conducted a trial on students involving eleven students. There were no suggestions or input given by the teacher or students so the researcher only made improvements to the learning media.

Based on the validation results by experts through validation sheets and the results of practicality through student response questionnaires, the developed learning media can be used as a learning media product by teachers in the teaching and learning process of spatial geometry material in making learning media. Based on these data, the media product entitled Wordwall-Based Learning Media in Mathematics Subjects for Class IV has been classified as very valid and very practical in its use.

CONCLUSION

Research on the development of wordwall-based learning media in mathematics subjects for grade IV at SDN 1 Cempaka. This study uses the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). Before the media product was tested on students, validation was carried out by experts (material experts, media experts and classroom teacher practitioners). The results of the assessment from material experts were 3.66 (very valid), the results of the assessment from media experts were 3.66 (very valid) and the results of the assessment from classroom teacher practitioners were 3.70 (Very valid). The trial to student was conducted with a total of 11 students. The trial was conducted to determine the practicality of using the learning media product. The results of the trial to eleven students obtained an average percentage value of 94% (very practical). Based on this description, the media product that has been developed by researchers and entitled Wordwall-Based Learning Media in Mathematics Subjects, Grade IV Spatial Building Materials has been classified into the category of very valid and very practical in its use so that it is suitable for use in learning at school.

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