



Development of a wordwall evaluation tool on statistics material to increase students' learning motivation

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ABSTRACT

Education serves as the fundamental foundation in guiding and developing the potential of every individual in order to create a competent and high-quality generation. As an integral process, education plays a crucial role in shaping individuals' basic abilities, including affective, cognitive, and psychomotor aspects. In an effort to improve learning quality, this study aims to develop Wordwall-based evaluation media on statistical material as an attempt to enhance students' learning motivation and comprehension. This research employs a Research and Development (R&D) method using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The research stages include needs analysis, material analysis, student analysis, curriculum analysis, media analysis, and product development, to measure the feasibility and effectiveness of the media. Data were obtained through questionnaires, interviews, and evaluation tests, and analyzed using descriptive quantitative techniques. The results indicate that the validation carried out by media experts shows that this learning media is feasible for use, obtaining a score of 67% for all assessed aspects. In addition, material validation yielded a score of 88%, indicating good quality in terms of content. Based on the practicality questionnaires completed by students and teachers, it was found that this media is not only practical in its application, but also able to significantly improve students' motivation and understanding of statistical material. The Wordwall-based evaluation media is declared effective in improving learning quality by providing an interactive experience relevant to students' needs. This study contributes to media innovation in learning, particularly in the utilization of technology to support more engaging and efficient learning. These findings are expected to serve as a foundation for the development of similar media in the future.

Keyword: *Learning Media, Wordwall, Learning Motivation, Statistics*

PENDAHULUAN

Education is the foundation for guiding and developing the potential of every individual in order to create a competent and high-quality generation. Education also plays an important role in influencing the basic abilities of individuals, including affective, cognitive, and psychomotor domains (Nurul Marlita et al., 2024). Education further has specific objectives to be achieved, as stated in the Law of the Republic of Indonesia No. 20 of 2003, Chapter I, Article 1, which defines education as "a planned effort to create a learning environment and learning process so that learners can actively develop their potential to possess spiritual strength, self-control, personality, noble character, and skills needed by themselves, the community, the nation, and the state" (Rahayu et al., 2022). This process is typically carried out through teaching and learning activities (Nurul Marlita et al., 2024).

One of the subjects taught in schools, namely mathematics, functions to develop students' ability to use numbers and mathematical symbols to assist in solving problems in daily life (Putri Widyowati et al., 2023). Mathematics is often perceived as a difficult subject because its characteristics are abstract, logical, systematic, and filled with symbols and formulas that may be confusing. The difficulties found in mathematics learning demand teachers' creativity in developing instruction, both in terms of the methods and media used (Hasiru et al., 2021). Therefore, mathematics is one of the subjects taught at all levels of education, from elementary school to higher education (Nurhikmayati et al., 2021).

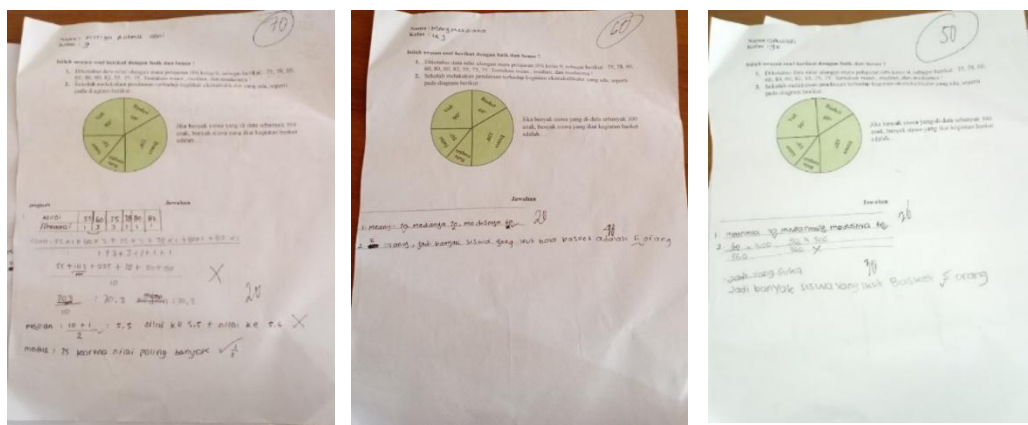


Figure 1. Observation Results

Based on preliminary observations conducted through an understanding test on statistical concepts administered to three students with low, medium, and high ability levels, the results showed that the average scores obtained were still below the Minimum Mastery Criteria (KKM) or the expected average score. In the study conducted by Nurul Marlita et al. (2024), it was revealed that students tend to be passive and teachers rarely vary the instructional media they use. Some students feel afraid of making mistakes when answering questions, asking, expressing opinions, and participating in discussions, especially when learning mathematics. In addition, many students feel bored and expect the presence of games in mathematics learning to make the classroom atmosphere less intimidating, for instance through the use of technology. However, in the mathematics learning process, teachers still do not fully utilize available instructional media, and learning activities remain conventional, resulting in low student motivation and understanding (Sudianto, 2021). Selecting appropriate and engaging strategies, learning models, and instructional media can help students feel more comfortable during the learning process, which in turn can affect their learning outcomes. This is particularly important in subjects such as mathematics, which is often perceived as difficult by most students (Inayati et al., 2023). Therefore, in the modern era marked by technological advancement, the use of innovative and engaging learning evaluation media is required.

One of the applications that can be used is Wordwall. Wordwall is a web-based online platform that can be used to create interactive learning media (Febriana et al., 2022). Wordwall is considered a



platform that is highly suitable for use as learning evaluation media because its interface is presented in the form of engaging games (Sulistiyorini et al., 2023). This media offers several advantages, including the ability to be accessed via mobile devices without the need to use a laptop or computer, as it incorporates various media elements such as text, graphics, audio, video, and games (Weni Febriani et al., 2023). Wordwall allows teachers to create evaluation activities in the form of interesting games, which can increase students' engagement and learning motivation.

In a study conducted by Auliya (2021), it was shown that the research was motivated by the lack of variation used by teachers in student evaluation activities. The study obtained a material validation score of 80.4%, categorized as feasible; a media validation score of 98.6%, categorized as highly feasible; and a language validation score of 96%, also categorized as highly feasible. Based on the practicality test using a student response questionnaire in a small-group trial, the media obtained a score of 92.4%, categorized as highly practical.

The development of Wordwall-based evaluation tools for statistical material remains limited, even though their role is essential in improving the quality of learning. As an integral component of the instructional process, a good evaluation tool must meet several criteria, such as validity, reliability, discrimination power, difficulty level, objectivity, and practicality. This study aims to produce an innovative and engaging Wordwall-based learning evaluation product, focusing on statistical material related to measures of central tendency. The evaluation tool developed is not only designed to increase students' learning motivation, but also places significant emphasis on the validity, practicality, and effectiveness of the content, which is packaged in the form of an educational game. By fulfilling these key criteria, this product is expected to serve as an effective solution in supporting statistics learning at various educational levels.

RESEARCH METHOD

This study is a development research employing the ADDIE model. The ADDIE model consists of five stages, namely analysis, design, development, implementation, and evaluation. However, this research is limited only to the development stage. The data collection techniques in this study include observation, interviews, and questionnaires. The data were analyzed using both qualitative and quantitative approaches (Septia et al., 2024). However, this research is limited only to the development stage.

Qualitative data were obtained through the analysis of trial results conducted by experts. These data were collected from comments and suggestions provided by mathematics educators as well as students involved in the trial process. Meanwhile, quantitative data were obtained through the analysis of the validity instrument scores, which were then calculated in the form of percentages. These percentages include assessments from the material expert validator, media expert validator, teacher

responses, and student responses. This analysis aims to evaluate the feasibility of the developed program, in order to determine whether it is suitable for implementation in the learning process.

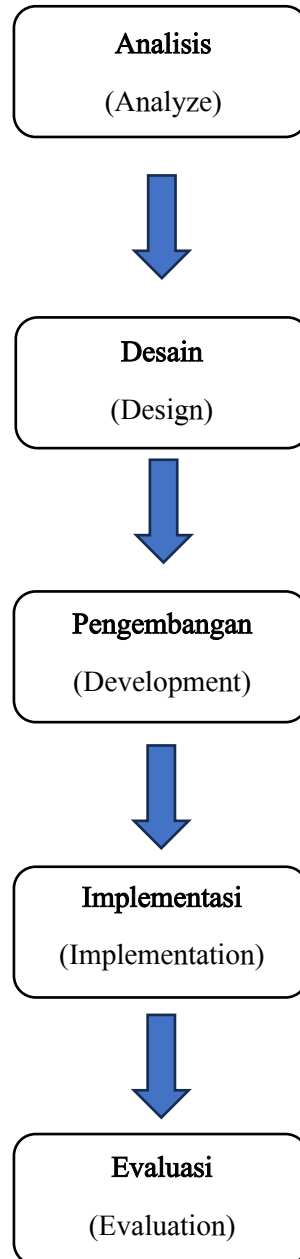


Figure 1. ADDIE Development Model

This study involved ninth-grade students of SMPN 2 Majalengka and a mathematics teacher as the research subjects. The instruments used for data collection included an essay test to measure students' mathematical abilities, media validation by an expert lecturer, and material validation by a mathematics teacher. In addition, teacher and student response questionnaires were also used to assess the practicality of Wordwall-based learning media and the improvement of students' learning



motivation. The respondents' answers to the instruments were analyzed using the formula proposed by (Widoyoko, 2015).

$$p = \frac{\text{skor total responden}}{\text{skor maksimum responden}} \times 100\%$$

The results of the data analysis were then classified based on the assessment criteria from the media expert and material expert validation questionnaires. The assessment criteria for the aspects of validity and practicality are presented in Table 1 and Table 2.

Table 1. Validity Assessment Criteria for Wordwall Media (Sugiyono, 2016)

Presentase	Criteria
25%-43%	Not Valid
44%-62%	Less Valid
63%-81%	Valid
82%-100%	Very Valid

Table 2. Validity Assessment Criteria for Statistics Material (Sugiyono, 2016)

Presentase	Criteria
25%-43%	Not Valid
44%-62%	Less Valid
63%-81%	Valid
82%-100%	Very Valid

To evaluate the practicality of using Wordwall media by teachers and to measure the improvement in students' learning motivation, an analysis was carried out based on the responses to the questionnaires administered to both students and teachers. The results of the questionnaires were analyzed using a Likert Scale to obtain structured and objective data. The scale was presented in the form of a checklist consisting of both positive and negative statements, with four answer choices as follows:

Positive Statements

Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1

Negative Statements

Strongly Agree = 1, Agree = 2, Disagree = 3, Strongly Agree = 4

The final results were then calculated using the following formula:



$$P = f/N \times 100\%$$

With the following description:

P: Percentage

f: Total score of correct responses

N: Total ideal score

The results were then classified into several criteria presented in Table 3 and Table 4.

Table 3. Practicality Assessment Criteria for Teachers Toward Wordwall Media (Widoyoko, 2015)

Presentase	Criteria
25%-43%	Not Valid
44%-62%	Less Valid
63%-81%	Valid
82%-100%	Very Valid

Table 4. Student Motivation Assessment Criteria (Hidayat, 2009)

Presentase	Criteria
67%-100%	High / Strong Motivation
34%-66%	Moderate Motivation
0%-33%	Low / Weak Motivation

RESULTS AND DISCUSSION

The development of a Wordwall-based evaluation tool to enhance students' learning motivation was carried out using the ADDIE development model, which in this study was limited to the development stage. The development process consisted of three main stages, namely the analysis stage, the design stage, and the development stage. The detailed steps in each stage were systematically designed to encourage innovation in the use of Wordwall as an effective learning medium for improving students' learning motivation, as follows:

Analysis Phase

At this stage, a needs analysis, learner analysis, media analysis, learning motivation analysis, material analysis, and curriculum analysis were carried out.

1. Needs Analysis

At this stage, a competency test was conducted by administering essay questions on statistics to students with low, medium, and high ability levels to measure their mathematical abilities. The



results of the analysis of the students' answers showed that the average score was below the Minimum Mastery Criteria (KKM).

At this stage, interviews were also conducted, and the results showed that students were not interested in mathematics because the learning process was monotonous, with no media used at all, and there were no group discussions or ice-breaking activities related to the mathematical content. Students' interest emerged when they understood the material, and they expected a learning process that was not monotonous. When they understood the material, their self-confidence increased, which in turn fostered learning motivation toward the subject.

Furthermore, articles were reviewed which indicated that students' interest and motivation in learning mathematics tend to be low, as well as a lack of variation in the use of instructional media by educators. These stages were carried out to meet the needs of the students and to gather relevant information related to the product to be developed.

2. Student Analysis

At this stage, interviews were conducted with students to identify their interests and motivation toward learning mathematics. The results of the interview analysis showed that students were less interested in mathematics because the learning process in the classroom tended to be monotonous. The teaching method was still dominated by lectures, while learning media were rarely used, either as evaluation tools or as part of the teaching and learning process. Analisis Media

In the study conducted (Poçan et al., 2023) it is explained that it is possible to see that technology, which is a part of our lives, has an intense reflection on education. The mobile technology concept is intertwined with designing a seamless learning environment following the rapid developments.

Therefore, at this stage an analysis was carried out on various application-based and web-based learning media to support the teaching and learning process that utilizes technology. This analysis aimed to identify the advantages, challenges, and the effectiveness of using technology-based learning media in improving students' understanding and motivation in the learning process. Several platforms analyzed include Kahoot, Quizizz, Educaplay, and Wordwall. The analysis was conducted based on criteria such as ease of use, flexibility in content creation, variety of features, student engagement, and effectiveness in supporting learning evaluation.

After a selection process, Wordwall was chosen as the most suitable learning media to support this research. The selection of Wordwall was based on several advantages it offers compared to other platforms, such as the ability to operate both online and offline. Wordwall also provides a variety of interactive game and quiz templates, such as "Match Up", "True or False", "Quiz", "Anagram", and "Random Wheel", which can be customized according to learning needs. In addition, Wordwall includes features for recording and analyzing students' activity results, enabling teachers to evaluate



learning outcomes in real time. Based on these advantages, Wordwall was selected as a learning media that can increase students' interest and motivation in learning, as well as effectively support the learning evaluation process.

3. Analysis of Learning Motivation

At this stage, questionnaires were distributed to three students with low, moderate, and high ability levels to measure their learning motivation. The questionnaire was constructed based on indicators of intrinsic and extrinsic learning motivation, which include:

1. The presence of interest and willingness to learn,
2. The presence of encouragement and learning needs,
3. The presence of expectations and future aspirations,
4. The presence of rewards or appreciation in the learning process,
5. The presence of engaging learning activities, and
6. The presence of a conducive learning environment.

The results of the questionnaire analysis indicate that the students have a low level of learning motivation, as presented in Table 5.

Table 5. Initial Analysis of Students' Learning Motivation Level

No.	Respondent	Average Score	Category
1.	High-Ability Students	65%	Moderate Motivation
2.	Medium-Ability Students	52 %	Moderate Motivation
3.	Low-Ability Students	47%	Moderate Motivation

The students tended to be less motivated to learn mathematics independently and demonstrated low self-confidence when solving problems. They relied more on answers obtained from the internet rather than their own work. In addition, the absence of rewards or reinforcement during the learning process was also identified as a factor contributing to the low learning motivation.

4. Material Analysis

This stage aims to define the scope of the statistics material to be developed in the study, focusing on the concepts of mode, mean, and median using single data sets. The selection of this material was based on its relevance to students' needs and its appropriate level of difficulty, thereby supporting the optimal understanding of fundamental statistical concepts.

The concepts of mode, mean, and median were selected because they represent the core of descriptive statistics that students need to understand, both in the context of formal learning and real-life applications. The focus on single data aims to simplify the learning process, allowing students



to comprehend the concepts and calculation techniques gradually, without the complexity of grouped data.

In addition, the limitation of the material was also based on the results of the students' needs analysis and feedback from the teacher, which indicated that students often experience difficulties in understanding statistical calculations and interpretations. By focusing on these three concepts, the learning process is expected to become more structured and effective, and to improve students' understanding of basic statistics.

5. Curriculum Analysis

Curriculum analysis was conducted to determine the suitability of implementing statistical material in mathematics subjects for Phase D, particularly in Grade VIII. Based on the Merdeka Curriculum, Phase D includes Grades VII to IX, during which students are at the stage of cognitive development from concrete to formal thinking. At this stage, students are expected to develop logical, analytical, and systematic thinking skills in solving problems related to daily life.

Statistical material, particularly those focusing on the concepts of mode, mean, and median in single data sets, is highly relevant to be taught in Grade VIII. This material aligns with the learning outcomes of Phase D, which include the students' ability to:

1. Process and analyze data in simple forms,
2. Understand and interpret information from statistical data, and
3. Use statistical concepts to support logical decision-making.

In the context of the curriculum, mastery of statistical material at this phase also contributes to the achievement of the Pancasila Student Profile, particularly in the element of critical thinking. Through learning statistics, students are trained to identify patterns, analyze data, and draw conclusions based on valid evidence.

In addition, statistics is closely related to the core objectives of the curriculum, which aim to prepare students to become individuals who are capable of solving complex problems and facing the challenges of the 21st century. This material provides the numeracy literacy skills needed to understand data in daily life, such as in the fields of economics, science, and technology.

Design Phase

This stage refers to the process of designing the Wordwall-based learning media, which is developed to support the evaluation of learning on statistical topics. The design steps were carried out systematically to ensure that the resulting media is not only visually appealing but also supports the learning objectives. The detailed steps in the design stage are as follows:

1. Selecting and Designing Statistical Questions

At this stage, appropriate questions were selected and developed based on the statistical material, particularly the concepts of mode, median, and mean for single data. The questions were designed

based on relevant pedagogical principles by considering students' ability levels. The data used in the questions were taken from real-life contexts to enhance students' connection to and understanding of the material.

2. Enhancing Wordwall Features through a Premium Account

During this design stage, the Wordwall account used was upgraded to a premium account in order to gain access to various additional features. The premium features allow the use of more diverse templates, customization of visual elements, and the provision of interactive evaluations that can enhance students' learning experiences.

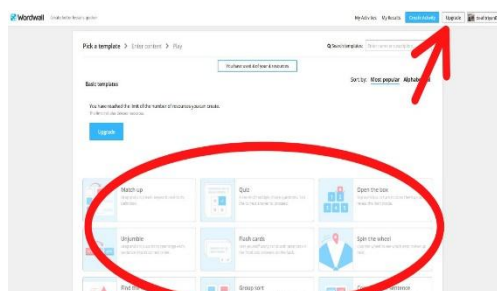


Figure 2. Wordwall Basic

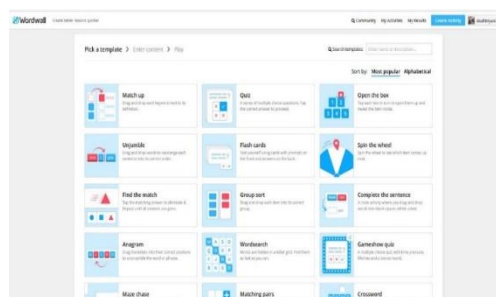


Figure 3. Wordwall Premium

3. Designing the Appearance and Structure of the Learning Media

The design process includes creating the layout and structure of the learning media on the Wordwall platform. The design is intended to attract students' interest by incorporating engaging visual elements, such as bright colors, well-organized layouts, and supporting icons.

A. Template Selection

The researcher selected three templates, namely the *True or False*, *Gameshow Quiz*, and *Open the Box* templates.

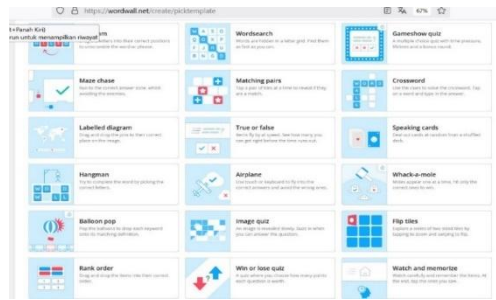


Figure 4. Template Selection

B. Entering Questions into the Template

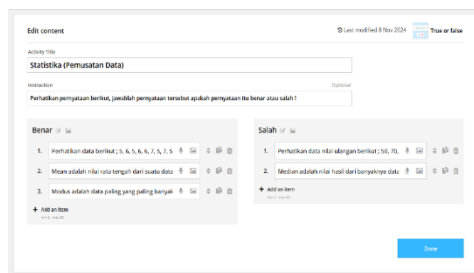


Figure 5. Entering questions into the True or False template

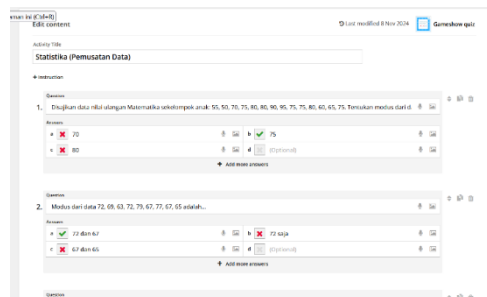


Figure 6. Entering questions into the Gameshow Quiz template

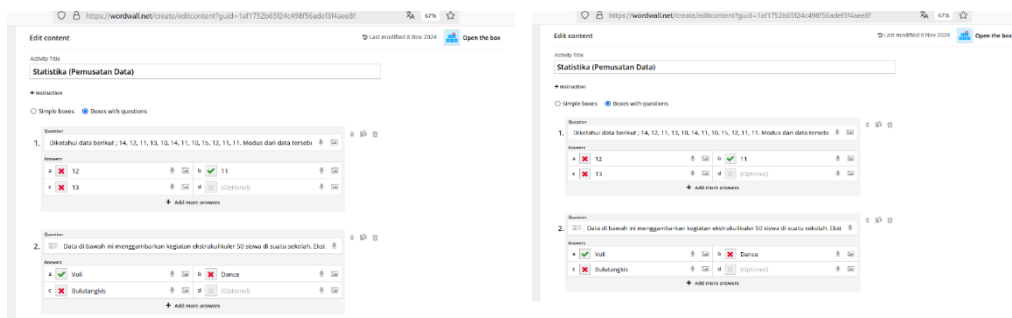


Figure 7. Entering questions into the Open the Box template

C. Visual Customization

At this stage, visual themes, time settings, end-of-game rules (error limit), and fonts were selected. The audio features were automatically adjusted according to the selected theme.

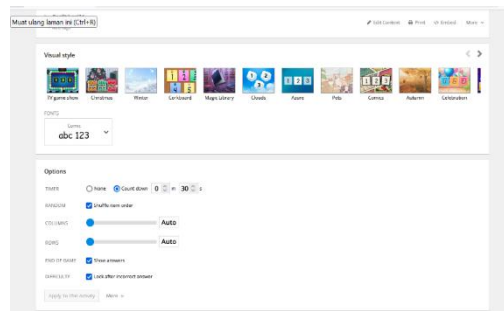


Figure 8. Customization of theme, timer, fonts, and error limit

D. Wordwall Product

After the design of the Wordwall learning media was completed, the product was ready to be used. The link to access the product is as follows:

1. <https://wordwall.net/resource/81496226>
2. <https://wordwall.net/resource/81494942>
3. <https://wordwall.net/resource/81496625>

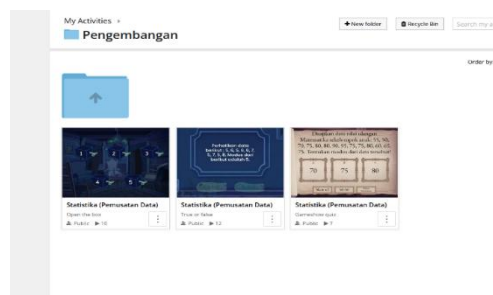


Figure 9. Wordwall Product

The design steps in this stage were carried out to produce a learning media that is not only aesthetically appealing but also supports student engagement in understanding statistical concepts. The design stage serves as an essential foundation before proceeding to the next stage.

Development Stage

After the learning evaluation media was successfully designed, the next step was the development stage, which involved a validation process and testing to ensure the feasibility and effectiveness of the media. The validation was conducted in two main phases: media expert validation and material expert validation, followed by collecting responses from students and teachers through questionnaires. This stage aimed to evaluate the quality of the learning media from various aspects, including design, content, and its applicability in the learning process.

1. Media Expert Validation

Media validation was carried out by a media expert to evaluate the technical aspects, design, and interactivity of the learning media. The assessment included indicators such as ease of use, visual display quality, design consistency, and the ability of the media to attract students' interest.

This process aimed to ensure that the developed media not only functions technically but also provides an engaging and easily accessible learning experience. Meanwhile, the media expert validation sheet was used to assess the suitability between the developed quizzes and games with the technology and learning media (Inayati et al., 2023). The results are presented in Table 6 as follows:

Table 6. Media Expert Validation Results

No.	Assessment Aspect	Average Score	Category
1.	Creativity Aspect	75%	Valid
2.	Effectiveness Aspect	63%	Valid
3.	Instructional Material Design and Appearance Aspect	65%	Valid
Average score for all aspects		67%	Valid

Based on Table 6, it can be seen that the cumulative result of the media expert validation obtained an average score of 67% with the criterion of “Valid.” It can be concluded that the Wordwall evaluation media is feasible to be tested.

2. Material Validation

Material validation was conducted by a subject-matter expert to assess the compatibility of the learning media content with the applicable curriculum, the accuracy of the concepts, and the relevance of the material to the learning objectives. The primary focus of material validation was to ensure that statistical concepts such as mode, median, and mean using single data were presented accurately and appropriately according to students’ developmental levels. The results are presented in Table 7 as follows:

Table 7. Material Expert Validation Results

No.	Assessment Aspect	Average Score	Category
1.	Content Feasibility Aspect	84%	Very Valid
2.	Presentation Feasibility Aspect	100%	Very Valid
3.	Language Feasibility Aspect	75%	Valid
Average score for all aspects		88%	Very Valid

Based on **Table 7**, it can be seen that the cumulative score from the material expert validation obtained an average of **88%**, with the category “*Very Valid*.” It can be concluded that the Wordwall evaluation media focusing on the statistics material is feasible to be applied.

3. Students’ and Teacher’s Responses

After the validation process by the experts was completed, the developed media was tested on students and teachers. In this stage, a questionnaire was distributed to students to measure their level of interest, ease of use, and learning motivation while using the media. A teacher questionnaire was used to evaluate the effectiveness of the media in supporting learning activities, its suitability with students’ needs, and the ease of integrating the media into classroom instruction.

The results of the teacher questionnaire assessing the practicality of the Wordwall media are presented in Table 8.

Table 8. Results of Teacher Practicality Validation

No.	Assessment Aspect	Average Score	Category
1.	Interactive Aspect	92%	Very Valid
2.	Efficient Aspect	88%	Very Valid
3.	Creative Aspect	81%	Valid
Average score for all aspects		94%	Very Valid

Based on Table 8, it can be seen that the cumulative result of the teacher practicality validation obtained an average score of 94%, with the category “*Very Valid*.” It can be concluded that the learning media is effective in increasing student participation and providing flexibility in instruction.

Meanwhile, the results of the student questionnaire from the low-, medium-, and high-ability groups showed positive responses toward the developed learning media. Students stated that the media was engaging, interactive, and helpful in improving their understanding of statistical concepts. The results of the students’ questionnaire analysis regarding their learning motivation are presented in Table 9.

Table 9. Analysis of Increased Learning Motivation

No.	Respondent	Average Score	Category
1.	High-Ability Students	70%	High Motivation
2.	Medium-Ability Students	68%	High Motivation
3.	Low-Ability Students	55%	Moderate Motivation



Based on Table 9, it can be seen that the average percentage of students' learning motivation shows a value above 67%, which indicates that their learning motivation is categorized as very strong or high.

CONCLUSION

Based on the results of the study that has been conducted, it can be concluded that the development of Wordwall-based evaluation media on statistics material demonstrates a high level of feasibility and effectiveness in supporting learning. This media was designed by integrating aspects of interactivity, student engagement, and the use of modern technology, thus being able to significantly improve students' understanding of the material. Expert validation shows that this media fulfills the eligibility criteria in terms of content, language, and technical aspects. Positive responses from teachers and students also indicate that Wordwall media is not only engaging but also able to create a more dynamic and participatory learning atmosphere.

In conclusion, Wordwall as an evaluation media provides a real contribution to improving the quality of learning, especially in delivering materials that require a deep mastery of concepts such as statistics. In addition, this media supports the role of teachers in utilizing technology to design more varied and structured evaluations, while reducing student boredom in traditional learning. The results of this study are expected to serve as a reference for the development of similar learning media in the future, as well as to encourage innovations that are relevant to the needs of education in the digital era.

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