

Development Of Interactive Learning Media Based On Wordwall In Science Learning At Elementary School

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Abstract: This study aims to develop interactive learning media based on Wordwall in the subject of science for grade IV at SD Negeri Jatiwates 1 Jombang. The research method used is the ADDIE development model which includes five stages, namely Analysis, Design, Development, Implementation, and Evaluation. The research subjects consisted of 20 fourth grade students and involved design experts, material experts, media experts, and colleagues as validators. The results of validation from experts and trials on students showed that Wordwall-based learning media were included in the "very feasible" category for use in the learning process. This media is able to increase motivation, learning activities, and student learning outcomes. The advantages of this media lie in its attractive visual appearance, high interactivity, and suitability to the learning characteristics of elementary school students. This study recommends the use of Wordwall as an alternative media in thematic learning in elementary schools, as well as opening up opportunities for further development in various subjects and levels of education.

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Introduction

The success of learning is greatly influenced by the students' interest in learning, learning can achieve optimal results if students have a high interest in learning, conversely learning will not be successful if students do not have an interest in the learning. Therefore, efforts to create a fun learning process are needed to spark students' interest in learning. One effort that teachers can make is to provide students with learning according to the times.

The rapid development of science and technology today has brought many changes in various aspects of life, including in the field of education. One of the most significant changes is the use of learning media as a tool in the teaching and learning process. Learning media can be an effective means of conveying information and knowledge to students.

One of the learning media that is currently being developed is Wordwall-based learning media. Wordwall is one of the most well-known animation maker applications today. The various features and conveniences it has make Wordwall a favorite and very popular animation program choice.

The use of Wordwall-based learning media has several advantages, including being able to attract attention and increase students' motivation to learn, facilitate the delivery of materials, and help students understand abstract concepts more concretely. In addition, this media can also increase interaction between teachers and students, as well as between students, so that the learning process becomes more effective and enjoyable. One of the subjects that can be optimized by using Wordwall-based learning media is Natural and Social Sciences (IPAS) for grade 4, the material Plants, Sources of Life on Earth. This material requires learning media that can present information in a structured, systematic, and interesting way. By using Wordwall-based learning media, it is hoped that students can understand the concept of plant body parts, photosynthesis, and plant development more easily and enjoyably.

SD Negeri Jatiwates 1 is one of the elementary schools located in Tembelang District, Jombang Regency. Based on initial observations, it is known that the IPAS learning process in grade 4 of SD Negeri Jatiwates 1 still tends to be teacher-centered and does not utilize learning media that is interesting for students. This can have an impact on the low motivation and interest in learning of students, as well as their understanding of the science and natural sciences material.

In addition, based on interviews with grade 4 teachers at SD Negeri Jatiwates 1, it is known that teachers still have difficulty in developing innovative and interactive learning media, especially Wordwall-based learning media. In fact, the use of interesting learning media that is in accordance with the characteristics of students can help improve the quality of learning in the classroom.

Therefore, researchers are interested in developing Wordwall-based learning media for grade 4 science and natural sciences material at SD Negeri Jatiwates 1. It is hoped that through the development of this learning media, the science and natural sciences learning process can become more interesting, interactive, and effective, so that it can improve students' understanding and learning outcomes.

Wordwall is one of the applications that can be used to create interactive learning. This website-based application can be used to create learning media such as quizzes, matching, pairing, random words, word searches, grouping, and so on. According to Ninawati (2021) (in Permana, S. P., 2022, p. 7833), wordwall is a tool that can be used to assess student learning. The assessment functions of wordwall media, which include grouping, quick essays, matching, and quizzes, each have unique qualities. Meanwhile, according to Kurniasih (2021) (in Sinaga, Y. M., 2022, p. 1847) Wordwall is one of the web programs offered to support classroom activities such as games to create an interactive environment, is one of the online programs offered as an effort to improve educational activities such as games to create an interactive environment in the classroom.

According to Khairunisa (2021) (in Nisa, MA, 2022, p. 142) wordwall is a digital game-based learning program called wordwall-based educational games that offer various quiz elements with a combination of moving images, colors, and sounds in the form of games that teachers can use to teach. Wordwall games make it easy for teachers to use original methods

in assessing student material. In line with that, Sherianto (2020) (in Wafiqni, N., 2021, p. 70) stated that Wordwall is an interesting application on the browser. This application is specifically intended as a learning resource, media, and assessment tool that is fun for students. The wordwall page also provides examples of teacher creations so that new users get an idea of what creativity will be like. A website called Wordwall offers Pilihlahan educational games that are intended as evaluation tools and entertaining resources for students. According to Lestari (2021) (in Nisa, M.A., 2022, p. 142) it is also easy for students to use and can be accessed via their own devices and computers.

From the several definitions above, wordwall learning media is one of the interactive media that offers various game features and quizzes that can be used as an assessment tool and can be used as an effort to improve student learning outcomes. There are many templates in the wordwall that can be used by teachers to make learning more fun.

Research Method

In developing a model to produce products about interactive learning media based on Wordwall in science learning for grade 4 at SD Negeri Jatiwates 1 Jombang using the ADDIE Model with the following development steps: Analysis: The goal is to identify learning needs, student characteristics, and gaps between ideal and actual conditions. Design: The goal is to design an initial prototype of interactive media based on Wordwall according to the analysis results. Development: The goal is to create learning media based on Wordwall and conduct validation tests. Implementation: The goal is to implement media in grade 4 of SD Negeri Jatiwates 1 Jombang and observe its effectiveness. Evaluation: The goal is to evaluate the feasibility and effectiveness of Wordwall learning media. Final Output: Valid, practical, and effective interactive learning media based on Wordwall, Complete research report from each stage of ADDIE. Recommendations for the use of media in elementary level science learning.

The Student Trial Design was carried out in several stages, namely Small Group Trial, Medium Group Trial, and Large Group Trial (Operational Test). Subjects of the Study with the Number of Subjects: 20 students of Jatiwates 1 Elementary School, Tembelang District, Jombang Regency, East Java. Subject Characteristics: Average age: 9–10 years, Gender: Mixed (male and female), Background: The majority of students come from rural areas, Academic ability: Diverse (high, medium, and low), Familiarity with technology: Quite good (students are accustomed to using digital devices such as cellphones and computers at school/ICT laboratories). Subject Selection: Purposive sampling technique, namely grade IV students who actively take science subjects and are willing to be part of the Wordwall interactive learning media trial. Role of Subjects in Research: Participating in science learning using the developed Wordwall media, Completing pretests and posttests to measure improvements in understanding of the material, Providing responses to learning media through satisfaction questionnaires or light interviews, Involved in observing learning engagement in class.

Types of Data and Instruments By involving the Learning Design Expert Test, Material Expert Test (Science and Science Grade 4), Media Expert Test (Learning Technology / Wordwall), and Peer Test (Science and Science Teacher / Class Teacher). Data collection using a questionnaire according to the ability of the expert test to be measured in product development. Validation Data Analysis Technique (Qualitative Descriptive): Qualitative data analysis is carried out based on open and closed questionnaires given to validators. This process is carried out through data reduction, data presentation, and drawing conclusions, with the steps of data reduction analysis, data presentation, drawing conclusions, and follow-up or revision. In the Principle of Analysis, Focus on the substance of input, not just the amount, Input from various experts is reviewed triangulated, to see consistency between assessments, If there are differences of opinion between validators, the researcher uses considerations of the learning context in grade IV as the basis for revision decisions. The Final Results of Qualitative Analysis are a List of revisions based on expert input, A narrative summary of the strengths and weaknesses of the product, The researcher compiles the final version of the Wordwall media that has been validated and revised. Student Trial Data Analysis Technique (Qualitative Descriptive). Analysis Approach: Using the Miles & Huberman (1994) analysis model: Data reduction, Data presentation, and Conclusion drawing and verification. Data Reduction: This process is carried out by filtering and sorting the results of the questionnaire and observation notes from the trial: Likert and open-ended scale questionnaires are classified by category (media display, interactivity, ease, attractiveness, etc.). Student comments and responses are coded to find dominant response patterns, Technical difficulties or constraints are identified and grouped. Qualitatively Analyzed Instruments: Student response questionnaires (Likert + open), Teacher observation notes, Interviews, Direct student comments during practice. Learning Media Eligibility Criteria: Determination of eligibility is carried out based on four main aspects, in accordance with the learning media eligibility standards by BSNP (National Education Standards Agency) which are modified for the context of interactive Wordwall media. A 5-point Likert scale is used on the questionnaire instrument for each aspect: Scale

Table 1: Feasibility Assessment

Score Criteria	
5	Very Feasible
4	Feasible
3	Quite Feasible (Needs revision)
2	Less Feasible
1	Not Feasible

Determination of Final Feasibility Status: If the average value of all validators ≥ 3.00 the category is Feasible for use, If the average value < 3.00 the category Needs revision before use.

Result and Discussion

1. Qualitative Analysis of Learning Media Validation Results

The following is a qualitative analysis of the validation results of interactive learning media based on Wordwall for the 4th grade science subject at SD Negeri Jatiwates 1 Jombang. Validation was carried out by design experts, material experts, media experts, and peer teachers. This analysis includes data reduction, data presentation, drawing conclusions, and follow-up revisions based on the input provided.

Table 2. Qualitative Analysis of Media Validation

Validator	Components Assessed	Expert Comments/Input	Follow-up/Revision
Design Exper	Design suitability	The display order should be more coherent, from title, objectives, to activities	Revise the Wordwall display order
Material Expert	Concept accuracy	The ecosystem material is correct, but supporting images. should be added	Add illustrations/images of ecosystems
Media Expert	Interactivity	The game is interesting, but loading needs to be accelerated.	Change the type of Wordwall media to a lighter one
Peer Teacher	Suitability Students	Suitable for 4th grade students, but instructions for use are needed for teachers.	Add teacher guide at the beginning of the media

This document is part of the iterative and participatory learning media development process. The validation results are used as a basis for revising and refining the media so that it is suitable for use in learning.

Table 3: Validation Data Presentation (Open Questionnaire)

Validator	Component	Expert Comments/Input	Follow-up/Revision
Design Expert	Design suitability	The display order should be more coherent, from title, objectives, to activities.	Revise the display order of the Wordwall Revisi
Material Expert	Concept accuracy	The ecosystem material is correct, but supporting images should be added.	Add illustrations/images of the ecosystem
Media Expert	Interactivity	The game is interesting, but loading needs to be accelerated.	Change the type of media to a lighter Wordwall
Peer Teacher	Student suitability	Suitable for grade 4 students, but instructions for use for teachers are needed.	Add teacher guide at the beginning of the media

1. Qualitative Analysis of Learning Media Validation Results

Data is displayed in narrative and/or tabular form, reflecting:

Table 4. Recapitulation of Student Trial Results

Trial Stage	Focus Analysis	Qualitative Data Presentation
Small Group	Initial student response, spontaneous reaction	"Most students enjoy using the Wordwall game"
Medium Group	Media suitability, appeal	"10 out of 10 students like the colors and games, but 3 complain about slow loading"
Large Group	Impact on learning, motivation	"Most students show increased enthusiasm for learning"

Conclusion Drawing & Verification: After all comments and observation results have been analyzed: The researcher concludes the strengths and weaknesses of the media based on student perceptions, Compared between groups (whether positive responses are consistent in all three stages), Compiled a list of suggestions for improvement and aspects that need to be adjusted (for example in terms of technical or content).

Table 5. Presentation of Student Trial Data (Qualitative)

Trial Stage	Aspects Assessed	Summary Student Comments	Conclusion & Follow-up
Small Group	Ease of use	"Moving to questions too quickly", "Easy to play"	Add initial instructions, extend question time
Medium Group	Visual appeal	"Nice colors", "Fun like playing a game"	Colors and animations are maintained
Large Group	Learning effectiveness	"Can understand because playing the game helps"	Wordwall is suitable for science learning

B. Data Analysis

1. Design Expert Validation

Hasil Analisis Data Validasi Ahli Desain terhadap media pembelajaran interaktif berbasis Wordwall pada mata pelajaran IPAS kelas 4 di SD Negeri Jatiwates 1 Jombang. Analisis ini dilakukan berdasarkan angket yang diberikan, menggunakan skala Likert 1–4.

Results of Design Expert Validation Data Analysis of Wordwall-based interactive learning media for grade 4 science subjects at SD Negeri Jatiwates 1 Jombang. This analysis was conducted based on the questionnaire given, using a Likert scale of 1–4.

Table 6. Design Expert Validation Results

No	Aspects Assessed	Score Skor (1-4)	Comments/Input Komentor/Masukan
1	Suitability of design with characteristics of elementary school students	4	The design is very appropriate for the age of grade 4 students.
2	Layout and attractive visual appearance	4	The visual appearance is attractive and not confusing.

3	Clarity of navigation and instructions for use	3	Navigation is quite clear, but it should be given a more familiar icon.
4	Consistency of color and font	4	The selection of colors and fonts is consistent.
5	Interactivity and fun flow	3	It's good, but some transitions between questions feel fast.

Based on the validation results, the overall average score is 3.6. This shows that interactive learning media based on Wordwall has a design that is feasible to use with minor revisions to the navigation aspect and the flow of question transitions.

2. Validation by Material Experts

The results of the validation data analysis from material experts on interactive learning media based on Wordwall in the 4th grade science subject at SD Negeri Jatiwates 1 Jombang. This analysis was carried out based on the questionnaire given, using a Likert scale of 1–4.

Table 7. Results of Validation by Material Experts

No.	Aspects Assessed	Score (1-4)	Comments/Input
1	Suitability of the material with the basic competencies of 4th grade science	4	The material is in accordance with learning outcomes
2	Truth of concepts and information	4	The content of the material is accurate and not misleading.
3	Completeness of the material	3	Some subtopics need to be supplemented with visual explanations.
4	Ability to stimulate students' critical thinking	3	It is quite challenging, but more HOTS questions are needed
5	Suitability of the language with the level of student development	4	Simple language and appropriate for the age of the students.

Based on the validation results, the overall average score is 3.6. This shows that the material in the Wordwall learning media is suitable for use with some minor improvements, especially in adding visualizations and strengthening questions that train critical thinking.

3. Media Expert Validation

Table 8. Media Expert Validation Results

No	Aspects Assessed	Score (1–4)	Comments/Input
1	Visual appearance and aesthetics of the media	4	The design is very attractive and in accordance with the character of elementary school students
2	Ease of interface navigation	3	Navigation is quite good, but needs clearer icons for early students.

No	Aspects Assessed	Score (1–4)	Comments/Input
3	Quality of media interactivity	4	Interactive, fun, and motivates students to learn independently.
4	Compatibility with devices	4	Media can be accessed on both laptops and smartphones without significant obstacles
5	Stability and loading speed	3	Access is sometimes a little slow on low internet connections.

Based on the validation results from media experts, an average score of 3.6 on a scale of 4 was obtained. This means that interactive learning media based on Wordwall is considered suitable for use in the 4th grade science learning process. However, it is recommended to make minor revisions, especially in the aspect of interface navigation and optimization of loading speed for a better user experience.

4. Peer

Table 9. Peer Validation Results

No	No Aspects Assessed	Aspek yang Dinilai	Score (1–4) Skor (1–4)	Comments/Input Komentar/Masukan
1	Suitability of media with characteristics of grade 4 students		4	Media is in accordance with students' development level and interests.
2	Clarity of display and navigation of use		3	Navigation is quite clear, but initial instructions for use can be added.
3	Suitability of material with curriculum		4	Material is in accordance with the objectives of learning science for grade 4.
4	Media's ability to increase students' interest in learning		4	Students appear more enthusiastic when using this interactive media
5	Ease of use by teachers in grade		3	Short training is needed so that teachers can utilize the features optimally.

Peer validation results show that Wordwall learning media is suitable for use in class, with an average score of 3.6. This media is able to attract students' attention, is in accordance with the curriculum, and is quite easy to understand. However, to increase ease of use for teachers, short training or a usage guide is recommended.

5. Results of Student Response Analysis – Small Group Trial

Table 10. Results of Student Response

No.	Aspects Assessed	Average	Score (1–4)	Student Comments
1	Media is easy to use	Media mudah digunakan	4	"I can play it myself without help." "Saya bisa memainkannya sendiri tanpa bantuan."
2	Attractive and fun display		4	The pictures are cute and the colors are nice.
3	Questions are easy to understand and in accordance with the material		3.8	"There are questions that I don't understand, but the others are easy."
4	Increases enthusiasm for learning		4	"I'm happy because it's like playing while learning."

No.	Aspects Assessed Average	Score (1–4)	Student Comments
5	Time of use is appropriate and not boring	3.6	“Fun, but if it’s too long it gets tiring.”

Based on the results of the small group trial, students showed a very positive response to the Wordwall learning media. An average score of 3.88 indicates that this media is very feasible to use, fun, and easy for students to understand. However, the duration of use needs to be adjusted so that students do not feel tired.

6. Results of Student Response Analysis – Medium Group Trial

Table 11. Student Response Results

No.	Assessed Aspect Average	Score (1–4)	Student Comments
1	The media is easy to use	4	“It’s easy to play, I understand how.”
2	The display is attractive and fun	4	“The colors are bright and there are animations, it’s fun!”
3	The questions are in accordance with the material and easy to understand	3.7	“The questions are during class, but some are a bit difficult.”
4	Makes learning more exciting	4	“Learning is like playing a game, it’s really fun.”
5	Not boring and there’s enough time	3.6	“It’s fun, but don’t take too long.”

Based on the results of the medium group trial, the interactive learning media Wordwall received very positive responses from students. With an average score of 3.86, this media is considered easy to use, interesting, and motivating to learn. Several students suggested that the usage time should not be too long in order to stay focused and not get tired.

7. Results of Student Response Analysis – Large Group Trial

Table 12. Results of Student Responses

No	Aspects Assessed	Average (1–4)	Score	Student Comments
1	The media is easy to use	3.9		“I can immediately understand how to play it.”
2	The display is attractive and fun	4.0		“Good! Lots of colors and cute pictures.”
3	The questions are in accordance with the material and easy to understand	3.8		“The questions are similar to those in class, easy to understand.”
4	The media increases enthusiasm for learning	4.0		“So enthusiastic, learning is like a fun game.”
5	Not boring and the use of time is appropriate	3.7		“Really fun, but don't do it for too long or you'll get tired.”

The results of the trial in the large group showed that the Wordwall-based learning media was very well received by the majority of grade 4 students. With an average score of 3.88, students felt that this media was easy to use, visually appealing, and able to increase enthusiasm for learning. The suggestion from students was that the duration of use should not be too long so that they remain focused and not bored.

Discussion

The results of the study show that the use of interactive learning media based on Wordwall has a positive impact on improving the learning outcomes of grade 4 students in the subject of science. This is indicated by the average validation score of students in small, medium, and large group trials, all of which are in the "very feasible" category with an average score above 3.8 on a scale of 4. This finding is in line with research by Nurfadilah et al. (2022) in the *Journal of Pendas: Elementary Education* which states: "Wordwall media is effective in improving student learning outcomes because it is able to foster motivation and active involvement of students during the learning process."

Wordwall media has an attractive and game-based appearance, making students feel like they are playing while learning. This is evident from student comments stating that this media is fun and not boring. The gamification elements provided by Wordwall make students not feel pressured, but rather more motivated to solve problems. This is supported by Sutriah et al. (2022) in the *Innovative Journal*, which states: "The interactive visual display of Wordwall is able to attract students' attention and create a fun learning atmosphere."

During the trial, students showed high enthusiasm in using Wordwall media. They were actively involved in answering questions and even competing healthily in the games presented. This is in accordance with the findings of Nurlatifah & Mulyati (2022) who concluded: "Wordwall media can increase student learning activities because it is fun and game-based."

Elementary school students tend to like learning that is visual, interactive, and contextual. Wordwall meets these characteristics. Hasanah's research (2023) revealed that: "The use of game-based learning media such as Wordwall is very suitable for elementary school students because the approach is in accordance with the learning style of elementary school children."

The development of interactive learning media based on Wordwall in 4th grade science learning at SD Negeri Jatiwates 1 Jombang has proven to be effective, fun, and able to improve student learning outcomes. This media is not only in accordance with the developmental characteristics of elementary school students, but is also in line with the principles of technology-based learning and modern constructivism. This finding is reinforced by various previous research results that have been proven empirically.

Student Response to Wordwall Media, The results of data analysis from small group trials (5 students), medium (10 students), and large (30 students) showed that interactive learning media based on Wordwall received a very positive response from students. The overall average score of the three groups was in the range of 3.86 to 3.88 on a scale of 4, which indicates that this media is very suitable for use in 4th grade science learning. Students stated that Wordwall media is easy to use, has an attractive appearance, questions are in accordance with the material, increases enthusiasm for learning, and is not boring. Several students suggested that the duration of use should not be too long in order to stay focused and not bored.

Improving Student Learning Outcomes and Activities The use of Wordwall media in 4th grade science learning has been proven effective in improving student learning outcomes (Muflikha et.al. 2024, Asih et al. 2023, Ahmad et al. 2024, Meysandi et.al. 2024, Yuliana et.al. 2024, Furliana et.al. 2023). Increasing Student Interest and Involvement Wordwall media also has a positive effect on student learning interest (Sukma & Hedayani, 2024), Development of Critical and Creative Thinking Skills. The use of Wordwall in science learning can improve students' critical and creative thinking skills (Nabut et.al. 2024, Syafiullah et.al. 2025, Rahayu et.al. 2025).

Interactive Learning Theory, According to constructivist learning theory, effective learning occurs when students actively build knowledge through interaction with a meaningful learning environment. Interactive media such as Wordwall provides a learning environment that allows students to be actively involved and build their own understanding. Integration of technology in learning, such as the use of Wordwall media, can increase the effectiveness of learning by providing a more interesting and interactive learning experience (Santi & Arwin. 2024). Based on the results of data analysis and supported by previous theories and research, it can be concluded that the use of interactive learning media based on Wordwall in learning science for grade 4 at SD Negeri Jatiwates 1 Jombang is very effective in improving learning outcomes, interest, involvement, and critical and creative thinking skills of students. This media is suitable for use and is recommended for application in learning science at the elementary school level.

Conclusion

The development of interactive learning media based on Wordwall in the subject of Science for grade 4 at SD Negeri Jatiwates 1 Jombang has proven to be very feasible and effective to use. This is shown by the results of validation by design experts, materials, media, peers, as well as positive responses from students in small, medium, and large group trials. This media is able to increase motivation, learning activities, and student learning outcomes, and is in accordance with the learning characteristics of elementary school students.

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