



# Development of Teaching Materials on Mathematics Using Word wall in SMP Negeri 3 Depok City

Rudi Hartono<sup>1</sup> Ade Riyana<sup>2</sup>, Zainal Abidin Arief<sup>3</sup>, Widyasari<sup>4</sup>, Siti Jamilah<sup>5</sup> and Iis Aisyah Citra Dewi<sup>6</sup>

<sup>1,2,3,4,5</sup> Universitas Ibn Khaldun Bogor, Indonesia

<sup>5</sup> Universitas Bengkulu, Indonesia

rudihartono@uika-bogor.ac.id

**Abstract.** his study aims to develop interactive teaching materials based on Word Wall for Mathematics class VIII SMP Negeri 3 Kota Depok with the aim of increasing student motivation and learning outcomes on the material of linear equations of one variable. The research method used is Research and Development (R&D) with the Analysis, Design, Development, Implementation, Evaluation (ADDIE) model. The data collection techniques used in this research are observation, survey and documentation. The results showed that the Word Wall-based teaching materials developed were effective in increasing student learning motivation by [93]% based on the questionnaire results. In addition, the students' final test results also increased on average by [94] points compared to the initial test which was [87] points. The collaboration and visualisation features in World Wall are considered very interesting and help students be more active in the learning process so that students can understand the subject very well, effectively and efficiently.

**Keywords:** Development, Teaching materials, Wordwall, Maths

## 1 Introduction

Mathematics learning at the Junior High School (SMP) level often faces various challenges, one of which is the difficulty in attracting students' interest and attention. Many students consider mathematics to be a difficult and abstract subject, so they tend to be less motivated to learn and understand the material presented (Tarver, 2015). This low learning motivation has a negative impact on student learning outcomes (Wardani et al., 2020). Based on observations at SMP Negeri 3 Depok, it was found that many students have difficulty understanding basic mathematical concepts, especially when the teaching materials used by teachers are less interactive and not interesting for students.

In today's digital era, technology has developed rapidly and has great potential to improve the quality of learning, including in mathematics subjects. One of the innovations that can be used is the use of digital platforms such as Wordwall. Wordwall is a platform that allows teachers to create interactive teaching materials in the form of

games, quizzes, and other digital learning activities. By using Wordwall, the mathematics learning process can be more dynamic, interactive, and fun, so it is expected to increase students' participation and understanding of the mathematical concepts taught.

Although the potential of this technology is very large, observations show that its use in the development of mathematics teaching materials at SMP Negeri 3 Depok is still very limited. Many teachers have not fully utilized Wordwall as an effective learning tool. As a result, students still have difficulties in learning the material delivered conventionally. Therefore, efforts are needed to develop Wordwall-based mathematics teaching materials that can support the learning process in the classroom. The use of technology-based teaching materials is expected to be able to make students more active, directly involved in learning activities, and increase their motivation in understanding mathematics materials.

The development of these teaching materials is important because it can provide solutions in creating a more interactive and interesting learning atmosphere (Chiu & Churchill, 2014). With more interesting teaching materials and supporting the active participation of students, mathematics learning outcomes are expected to increase (Kul et al., 2018). The use of Wordwall in mathematics teaching at SMP Negeri 3 Depok can not only make learning more interesting, but also help students to more easily understand difficult concepts, through more visual and interactive activities.

Based on this, this study aims to develop mathematics teaching materials using the Wordwall platform at SMP Negeri 3 Depok. It is hoped that the development of this teaching material can provide real benefits in helping students understand mathematics subject matter better, as well as helping teachers create more interesting, fun, and effective learning. This research is also expected to contribute to the world of education, especially in utilizing technology to improve the quality of mathematics learning at the junior high school level.

The development of information technology-based teaching materials has become a concern in the world of education as an effort to improve the quality of learning. One of the widely used media is Kvisoft Flipbook Maker, which allows the creation of digital teaching materials with interactive displays, such as animation, video, and audio. According to research by Repi, Kaunang, and Pulukadang (2022), the use of teaching materials based on Kvisoft Flipbook Maker has proven to be effective in increasing students' understanding of comparative materials in grade VII students. They concluded that the teaching materials developed through Kvisoft Flipbook Maker meet the aspects of validity, practicality, and effectiveness with excellent results. Assessments from experts reached 93%, 89%, and 88% validity percentages, while responses from teachers and students were also very good with scores of 93% and 87%, respectively.

In a different context, Simamora and Rosmaini (2019) also developed Flipbook Maker-based teaching materials on fable text materials for grade VII students. They use the Research and Development (R&D) method with the Borg and Gall model, which includes several stages from problem identification to product testing. The results of

this study show that the electronic magazine based on Flipbook Maker is feasible to be used in learning with the eligibility percentages of material experts, designers, teachers, and students are 76.19%, 81.33%, 76.25%, and 72.41% respectively. This shows that the use of Flipbook Maker not only provides an alternative to interactive teaching materials, but is also effective in delivering learning materials.

The Research and Development (R&D) method as a model for the development of teaching materials was also adopted by Nurhayati, Nurdin, and Firman (2022), which focuses on the development of integrated modules of Al-Quran verses for the theme of health in class V of Madrasah Ibtidaiyah. They adopted the 4D development model, which includes four main stages: define, design, develop, and disseminate. The resulting modules were validated by material/design, language, and religion experts, which obtained very high validity results, reaching 89%.

In another study conducted by Hakam and Untari (2021), they developed a Flipbook-based e-learning module in basic programming subjects at vocational schools. They use the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model. This module is considered very feasible to use with a validity level of 95% from media experts, 95% from material experts, and 84% from student responses. These results emphasize that Flipbook-based modules are very effective as an alternative teaching material in the vocational education environment.

The importance of developing teaching materials based on digital technology, especially during the pandemic, was also explained by Rarasati and Yurniawati (2022). They stated that the electronic module based on the Pancasila character is very effective in online learning at high schools/vocational schools, where the module received a positive response with an average of 95% from PPKN teachers. This strengthens the argument that interactive module-based digital teaching materials not only help in understanding the material, but are also able to increase student engagement in the learning process.

From these various studies, it can be concluded that the development of teaching materials based on Kvisoft Flipbook Maker and similar technology has proven to be effective in improving the quality of learning. This is evidenced by the validity, feasibility, and positive response from students and teachers to the teaching materials developed. The use of interactive media in learning allows for a more interesting, motivating, and easier learning process for students to understand the learning material.

## 2 Method

The research method used in this study is Research and Development (R&D), which aims to develop and produce certain products and test the effectiveness of those products in the context of education (Laurens & Laamena, 2020)(Hervindo et al., 2021).

This research follows the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model, which is a systematic and sequential development model.

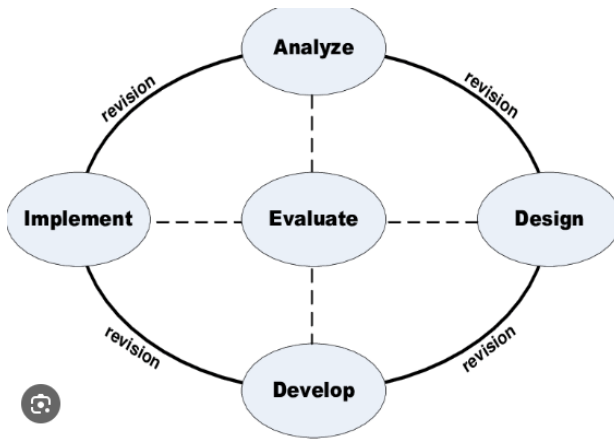


Fig. 1. Model ADDIE

**Analysis:** At this stage, the needs and problems faced in the learning process are identified. The researcher analyzes the needs of students, teachers, and learning contexts to determine the focus of teaching material development.

**Design:** After the analysis stage, the design of teaching materials or products to be developed is carried out. This stage includes content design, display, and learning strategies to be implemented.

**Development:** At this stage, the product or teaching materials that have been designed begin to be developed. Development includes the creation of teaching materials that are equipped with interactive elements such as animation, video, and audio that are in accordance with the designed learning model.

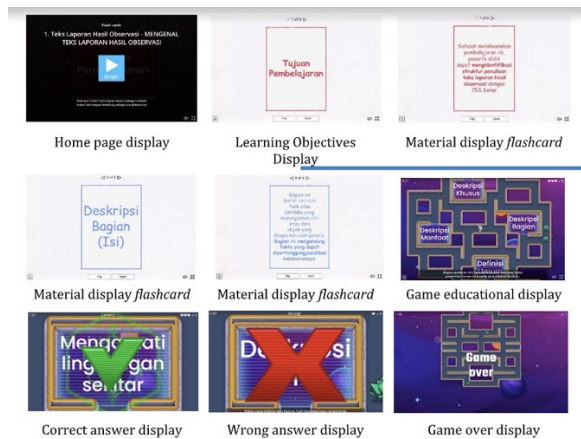
**Implementation:** The implementation stage involves the use of teaching materials developed in real learning situations. Teaching materials are tested on students to see how they function in the context of actual learning.

**Evaluation:** The last stage is evaluation, where the effectiveness and success of the product developed are evaluated. Evaluation is carried out formatively (throughout the development process) and summative (after implementation) to find out whether the product developed has met the learning objectives.

The data collection techniques used in this study include observation, survey, and documentation (HB et al., 2020). Observation is used to monitor and record student behavior and learning activities during product trials (Sahaat et al., 2020). The survey was conducted to collect data on the response of students and teachers to the products developed, as well as the level of student understanding of the material. Documentation is used to collect supporting information such as student learning outcome notes, photos, and relevant recordings during the research process. The combination of these techniques allows researchers to obtain comprehensive data regarding the effectiveness and feasibility of the developed teaching material products (Utami et al., 2019).

### 3 Result & Discussion

This research aims to develop Word Wall-based teaching materials that are effective in increasing student learning motivation and understanding of the material. Based on the results of data analysis obtained through questionnaires and initial tests and final tests, this Word Wall-based teaching material has proven to be very effective in achieving this goal.



**Fig. 2.** Result Developed Wordwall Model Learning

The results of the questionnaire showed that students' learning motivation experienced a significant increase, with an average motivation score of 93% after using Word Wall-based teaching materials. This increase reflects the enthusiasm and desire of students to be more actively involved in the learning process. This motivation is closely related to the collaboration and visualization features that exist on the Word Wall platform, which students consider very interesting and interactive (Rhine & Bailey, 2011).

In addition, the results of the final test of students have also experienced a significant increase. The average final test score of students reached 94 points, an increase from the average initial test score of only 87 points. This improvement shows that Word Wall-based teaching materials are not only able to increase student motivation, but also succeed in increasing students' understanding of the material being taught.

Overall, the results of this study show that Word Wall-based teaching materials have a great positive impact on learning, especially in terms of student motivation and learning outcomes. The increase in motivation of 93% and the increase in learning outcomes by 7 points from the initial test to the final test are strong evidence that the use of Word Wall as a learning medium is able to create a more dynamic, interactive, and effective learning atmosphere.

The results of the study that showed an increase in student learning motivation by 93% after using Word Wall-based teaching materials can be explained through several factors. First, Word Wall is a digital platform that allows the use of attractive visual media, such as images, diagrams, and animations. This visualization helps students better understand abstract concepts in learning, so that they not only receive information passively, but also actively participate in the learning process. This is consistent with the theory of visual learning which states that students tend to absorb information conveyed through visual media more easily, because it makes it easier to understand and remember.

The collaboration features contained in Word Wall also play an important role in increasing student motivation (Vu et al., 2021). Students can interact with their classmates through the collaborative tasks provided by this platform. Collaboration in learning allows students to share ideas, brainstorm, and solve problems together (Györi & Czakó, 2019). Thus, the learning process becomes more fun and less boring. Vygotsky's (2023) theory of social constructivism supports this idea, where social interaction in the learning process can help students build a better understanding through cooperation and communication with their peers.

In addition, the increase in student motivation can also be associated with the gamification element in the Word Wall. Some of the learning activities on the Word Wall, such as interactive quizzes and educational games, provide an enjoyable learning experience and motivate students to participate more actively. According to the theory of Self-Determination put forward by Deci and Ryan (2024), students' intrinsic motivation can increase when they feel in control of their learning process and can associate learning with fun activities. Gamification in Word Walls allows students to experience this, so their motivation to learn increases significantly.

The increase in students' final test scores from 87 points in the initial test to 94 points in the final test is also an indicator of the success of Word Wall-based teaching materials in improving students' understanding of the subject matter. An average increase of 7 points shows that the use of Word Wall has succeeded in making the learning process more effective and efficient. Some of the reasons why students' comprehension is improved can be traced to the characteristics of the Word Wall platform itself.

Firstly, the interactivity offered by Word Wall allows students to not only passively receive information, but also practice and apply their newly acquired knowledge in a variety of interactive activities. For example, students can participate in quizzes or games designed to test their understanding of the material. In this way, students can process information in more depth, which ultimately improves their learning outcomes. Second, the live feedback feature in Word Wall helps students to find out how well they understand the material immediately after completing an assignment or quiz. This feedback is very important in learning, as it allows students to immediately correct their mistakes and reinforce concepts they already understand. According to the cognitive theory developed by Bruner (2024), effective learning occurs when students get relevant and immediate feedback, so that they can improve their understanding in a timely manner. Word Wall facilitates this well through its existing features (Karpova et al., 2008)(Gonzales & Dinagsao, 2021).

Furthermore, Word Wall also supports an individualized learning approach. Each student can access teaching materials according to their own pace and learning style. The platform allows for the adjustment of the difficulty level of the assignment according to each student's ability, so that no student feels left behind or overwhelmed. Piaget, in his theory of cognitive development, states that each student has a different level of development, and the most effective learning is the one that is adjusted to the student's stage of cognitive development. In this context, Word Walls provide flexibility for students to learn according to their abilities, which ultimately improves overall learning outcomes.

However, although the results of this study show a significant positive impact, there are several things that need to be considered in the use of Word Wall as a teaching material. First, there needs to be optimal teacher assistance to ensure that students can use the features in Word Wall appropriately. Teachers play an important role in directing students, providing additional explanations, and ensuring that students are not only focused on the visual and game aspects, but also understand the core concepts they want to convey.

Second, the use of Word Wall requires access to adequate technology, both in terms of hardware (such as computers or tablets) and internet connections. In the context of schools that have limited technological facilities, the implementation of Word Walls may require adjustments or even other alternatives. Therefore, it is important to consider the readiness of the technology infrastructure in schools before implementing Word Wall-based teaching materials broadly.

Finally, while Word Walls have proven to be effective in improving student motivation and learning outcomes, not all subject matter may be suitable for delivery through this platform. Materials that are more conceptual or theoretical in nature may require other, more in-depth learning approaches, such as group discussions or project-based learning. Therefore, teachers need to be selective in choosing the material to be delivered through the Word Wall, and ensure that this method is in accordance with the learning goals to be achieved.

## 4 Conclusion

Overall, the results of this study show that Word Wall-based teaching materials are very effective in increasing student learning motivation and learning outcomes. The increase in student motivation by 93% and the increase in final test results from 87 points to 94 points showed that Word Wall was able to create a more interactive, engaging, and effective learning experience. However, the success of using Word Wall also depends on teacher assistance, the readiness of technological infrastructure, and the suitability of subject matter with this method

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