# EFFECTIVENESS OF THE WORDWALL MEDIA TO IMPROVE CRITICAL THINKING IN MATHEMATICS OF CHRISTIAN NANIA ELEMENTARY SCHOOL STUDENTS, AMBON

Ficca Agrelce Rumaruson [1], Wahyudi [2], Victor Imanuel Bolla [3]
[1,3] Postgraduate Student of Elementary School Teacher Study Program, UKSW Salatiga, Indonesia)
[2] Education Administration, UKSW Salatiga, Indonesia
Alamat e-mail : ficcaasesor@gmail.com[1], yudhi@uksw.edu[2], victorimanuelbolla@gmail.com[3]

## ABSTRACT

*Students will experience a decrease in interest and learning activities due to unattractive learning models and lack of innovation in the development of learning media. It requires the application of appropriate models and innovation in the use of learning media. This study aims to determine the improvement of students' critical thinking by using Wordwall media. The subjects of the study were 26 students of class V of Nania Ambon Christian Elementary School. Data collection techniques were carried out by tests, observation sheets and documentation. The results of the study showed that students' critical thinking skills increased from cycle I to cycle II. The results of the pre-cycle student completeness only reached 32.25%, this indicates that students' critical thinking is still low and needs improvement in learning. In cycle I, the results of students' critical thinking abilities have not met the minimum completeness with a percentage of 64.50%, so improvements need to be made in cycle II. Furthermore, in cycle II with a percentage of 80.65% with a good category. So it can be concluded that overall wardwall media can improve students' critical thinking abilities which have an impact on improving student learning outcomes in the learning process*

*Keywords: Wordwall Media, Critical Thinking, Mathematic*

## ABSTRAK

Siswa akan mengalami penurunan minat dan aktivitas belajar dikarenakan model pembelajaran yang kurang menarik dan kurangnya inovasi dalam pengembangan media pembelajaran. Hal ini memerlukan penerapan model yang tepat dan inovasi dalam penggunaan media pembelajaran. Penelitian ini bertujuan untuk mengetahui peningkatan kemampuan berpikir kritis siswa dengan menggunakan media Wordwall. Subjek penelitian adalah siswa kelas V Sekolah Dasar Kristen Nania Ambon yang berjumlah 26 siswa. Teknik pengumpulan data dilakukan dengan tes, lembar observasi dan dokumentasi. Hasil penelitian menunjukkan bahwa kemampuan berpikir kritis siswa mengalami peningkatan dari siklus I ke siklus II. Hasil ketuntasan siswa pra siklus hanya mencapai 32,25%, hal ini

menunjukkan bahwa kemampuan berpikir kritis siswa masih rendah dan perlu peningkatan dalam pembelajaran. Pada siklus I, hasil kemampuan berpikir kritis siswa belum memenuhi ketuntasan minimal dengan presentase 64,50%, sehingga perlu dilakukan perbaikan pada siklus II. Selanjutnya pada siklus II dengan presentase 80,65% dengan kategori baik. Maka dapat disimpulkan bahwa secara keseluruhan media wardwall dapat meningkatkan kemampuan berpikir kritis siswa yang berdampak pada peningkatan hasil belajar siswa dalam proses pembelajaran.

Kata Kunci: Media Wordwall, Berpikir Kritis, Matematika

## A. Introduction

The Industrial Revolution (IR) 4.0 encompasses education 4.0, which emerged as a result of the need for it. For example, elementary, middle, and high school curricula are being transformed to prepare students who will emerge from the education system to compete in the IR 4.0 era (Bonfield et al., 2020). According to Venkatraman et al. (2022), the Education 4.0 Framework aims to support the skills needs of Industry 4.0, including lifelong learning and soft skills development.

The learning process must be more contextual and flexible to meet students' individual learning needs in the digital era and the advancement of the Independent Curriculum. However, in practice, the use of various disparate learning tools, such as teaching materials, assessments, and presentation media, often makes it difficult for students to access and archive all learning information (Ko et al., 2025; Sandnes et al., 2024). Not infrequently, this situation causes students to be less interested or involved in lessons, especially in subjects that are considered complex such as mathematics.

Mathematics is a crucial field of study (Gumilar et al., 2024). Mathematics is a subject with a single answer, but it can be solved in various ways or using different methods (Nia et al., 2024). Mathematics is not just about calculations, but also a tool for developing critical thinking skills, problem-solving, and data-driven decision-making. This demonstrates that mathematics trains students to think logically and systematically, enabling them to analyze things more effectively (Nurhaliza et al., 2025). Ermawati et al., (2024) stated that the

goal of national education is to develop various thinking skills, such as logical, analytical, systematic, critical, and creative thinking skills, as well as the ability to work together in teams. Critical thinking skills in mathematics learning, or what is called mathematical critical thinking skills, are an important cognitive aspect that students must possess. Mastering these skills is crucial for facing the complex challenges of work and daily life (Haswati et al., 2024). Critical thinking skills are very important for students because they help them face various challenges in the 21st century (Winanda et al., 2025). Critical thinking plays an important role in building knowledge and developing students' conceptual systems, including the ability to analyze, evaluate, draw conclusions, and determine appropriate strategies (Saputra, 2020). Due to its abstract nature, students often find mathematics difficult to understand, which can hinder the development of their thinking skills (Amaliyah, 2024a). Therefore, teachers must create a pleasant learning environment so that students feel comfortable and more easily understand the lesson.

Critical thinking skills can be developed through education. Therefore, education in schools should not only teach knowledge but also teach students to think critically. A new challenge for teachers is preparing a learning system in the classroom by integrating students' knowledge and skills, especially critical thinking skills, so that they become adaptive, creative, critical, and innovative individuals. The appropriate learning system is one based on the Science, Technology, Engineering, and Mathematics (STEM) approach. Currently, the STEM approach is the choice in learning to produce a generation that is ready to face the 21st century (Mulyani, 2019). Thus, quality learning is achieved when supported by learning media to enhance students' critical thinking skills. Learning media must be designed to adapt to the conditions, interests, and learning styles of 21st-century students. Today's generation is highly mobile, app-dependent, and always connected. They prefer interactive gaming (gamification) for learning rather than doing homework from textbooks (Mulyani, 2019). Gamification is an appropriate

alternative learning medium to be implemented through the principles of a STEM-based learning system. STEM strongly supports the use of digital technology in the learning process to develop students' critical thinking skills (Maula & Fatmawati, 2020).

Critical thinking skills are essential for instilling in students from elementary school. However, students' critical thinking skills remain low due to ineffective and inefficient learning processes. Students are accustomed to working on intermediate to lower-level problems, rarely being presented with higher-level problems. Consequently, when teachers instruct students to do something, only one or two students participate. A 2014 survey by the Global Index of Cognitive Skills and Educational Attainment—overall results—showed that Indonesia ranked 40th out of 40 countries (Symonds, 2014).

Seeing these problems, teachers need to design innovative learning media to develop students' critical thinking skills. Learning media that is suitable for 21st-century students is a visual (visually literate) form using digital technologies such as gamification. Gamification is the application of games in video form that aims to be applied in other fields. Various digital technologies have been developed based on gamification principles, one of which is Wordwall. Wordwall is a digital media or application developed as a learning medium while providing various game features, namely 18 (eighteen) features for free (Sun'iyah, 2020). One of the features provided by Wordwall is the Labeled Diagram feature. Labeled diagrams are games by drawing lines from one point containing a statement label to a point in the form of the right object in the image. The labeled diagram Wordwall learning media is designed according to STEM principles. The benefits of STEM-based learning through the application of technology are to shape students in socializing, organizing, and having a social soul so that they are able to hone their critical thinking skills (Zuryanty et al., 2020).

Stated the characteristics of the labeled diagram Wordwall, including: 1) increasing student knowledge by playing while learning, 2) honing students' thinking power, attitudes, language, and abilities, 3) building a

fun learning climate, 4) making it easier for teachers to create questions and students to answer questions without having to write by hand, 5) the game is easy to use and suitable for today's generation of students, 6) many types of free games that teachers can use so that students do not get bored with just one game, 7) the labeled diagram Wordwall learning media is student-oriented, thus creating active students when discussing, expressing ideas or thoughts, and making decisions Pradani, (2022).

Based on the above problems regarding the low critical thinking skills of students, one of the causes is because the media used by teachers is not interesting, therefore, the researcher wrote an article about "the use of digital media in improving the critical thinking skills of school students in mathematics learning", because this digital media can be adjusted to the abilities, personalities, and interests of students, so that it can improve students' critical thinking.

**B. Methods**

This study employed Classroom Action Research (CAR). The model used in this study was Kemmis and McTaggart. This CAR was conducted in a fifth-grade class at Nania Christian Elementary School, with 26 students. The design used was a two-cycle design model, with each cycle consisting of four stages: planning, action, observation and evaluation, and reflection.

The first step in each cycle is to develop an action plan. The next step is to implement the action and observe the process. The results of the observations are then evaluated through reflection. If the reflection results in the first cycle indicate that the actions taken have not achieved the desired results, a new action plan is developed and implemented in the next cycle. This process continues until the desired results are achieved. The data collection technique used is a written test, and data analysis is carried out using quantitative methods, namely processing data using statistical techniques. To determine the percentage of student learning achievement, the formula used is as follows:

$$Learning\ completion = \frac{Number\ of\ students\ who\ completed}{total\ number\ of\ students} x100$$

**Table 1. Critical Thinking Skills Criteria**

| Gain Scale | Critical Thinking Category |
|---|---|
| 70-100 | High |
| 50-69 | Medium |
| 0-49 | Low |

(Herliati, 2022)

## C.Results and Discussion

This research was conducted in class V of Nania Christian Elementary School, Ambon, with the topic of combined area of flat shapes. Before implementing the learning improvements, the researchers conducted a pre-cycle. This pre-cycle activity did not use any media and only employed the lecture method.

After conducting the classroom action research as a whole, an increase in critical thinking indicators was obtained from the pre-cycle, cycle I and cycle II as can be seen in Figure 1. In the pre-cycle analyzing indicator, a value of 45% was obtained in the low category, cycle I obtained a value of 75% in the high category and cycle II obtained a value of 94% in the high category. In the pre-cycle synthesizing indicator, a value of 70% was obtained in the high category, cycle I obtained a value of 88% in the high category and cycle II obtained a value of 100% in the high category. In the pre-cycle recognizing and solving problems indicator, a value of 65% was obtained in the low category, cycle I obtained a value of 80% in the high category and cycle II obtained a value of 95% in the high category. In the pre-cycle concluding indicator, a value of 80% was obtained in the high category, cycle I obtained a value of 90% in the high category and cycle II obtained a value of 98% in the high category. In the pre-cycle evaluating indicator, a value of 45% was obtained in the low category, cycle I obtained a value of 68% in the medium category and cycle II obtained a value of 90% in the high category.
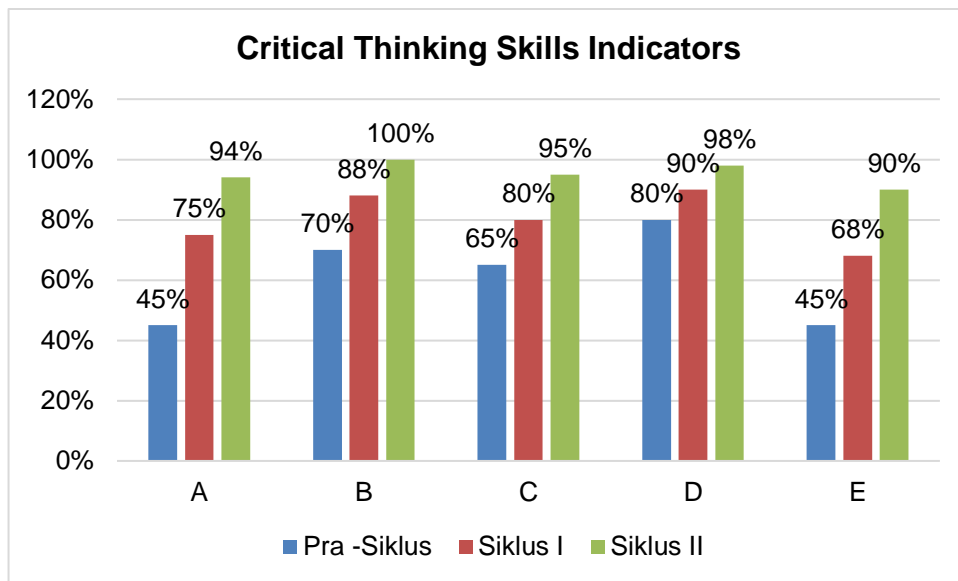
**Figure 1. Diagram of Students' Critical Thinking Indicators**

Information:
A: Analyze
B: Synthesize
C: Recognizing and Solving Problems
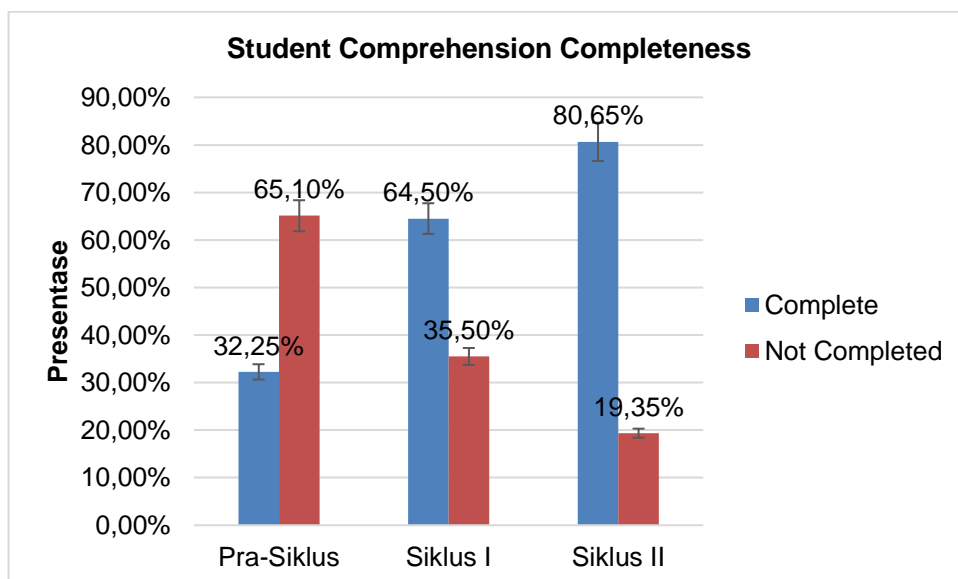D: Conclude
E: Evaluate or Assess



**Figure 2. Student Comprehension**

The pre-cycle score in Figure 2 shows that only 32.25% or 10 students completed the test. The pre-cycle score for students' critical

thinking skills was very low, necessitating improvements in learning. In cycle 1, the researcher used Wordwall media for learning improvement. The pre-cycle stage is the stage where the Wordwall media has not been implemented in the learning process; the researcher only used lecture and problem-solving methods. In the pre-cycle implementation, the average number of students was 16, which is considered low, necessitating improvements in the learning process. The research was conducted in cycles I and II, and was therefore stopped in cycle II because the criteria for student learning mastery had been met.

Figure 2 shows that in the first cycle that has been implemented, students' critical thinking skills have increased after the use of Wordwall media). This increase in critical thinking skills is obtained from the results of the final cycle test that was carried out independently by students. The results obtained that the students' classical completeness was 64.5%, namely 19 students completed while 7 students did not complete with a percentage of

35.50%. The average score obtained in this first cycle was 64.35 with the highest score of 85 and the lowest score of 35. So it still does not meet the KKTP determined by the school, which is ≥ 70. Therefore, it is a reflection to implement improvements in the second cycle.

Wordwalls are a highly diverse type of interactive media. Researchers divide Wordwalls into three types: quizzes, matching pairs, and spin the wheel. This is supported by the opinion that Wordwall is an interactive learning medium that includes quizzes, word searches, and web-based anagrams. It also provides 18 free templates that allow users to easily change templates from one task to another (Ma'rifah et al., 2022).

The Wordwall created by researchers apparently made students more interested in learning. They appeared more active in answering questions, even competing to answer them. Wordwalls have many advantages, including an attractive appearance and entertaining quizzes. They also help educators convey material more easily and can increase student

enthusiasm for learning (Lubis et al., 2022).

The research results show that based on the results of the observations of cycle I, several shortcomings were obtained, including: students were still passive in providing responses and answers to teacher questions and did not dare to come forward to work on the examples of questions given by the teacher. Based on the shortcomings in cycle I, learning improvements were made in cycle II. These improvements included: motivating students by providing daily life questions that were appropriate to the material, and of course using a different method from cycle I, not only that in cycle II and giving appreciation to groups or individual students who could work on the examples of questions given by the teacher. According to Permana & Kasriman, (2022) the use of Wordwall media plays an important role in improving students' critical thinking skills. Through designed activities, students are invited to analyze, evaluate, and create solutions to various mathematical problems. For example, when students are involved in a quiz game, they are not only required to answer questions, but also have to provide solutions to a problem contained in the quiz question (Nisa & Alwi, 2024).

This encourages students to think more deeply and critically about the mathematical concepts taught. Herliati (2022) stated that critical thinking skills provide an important reference in thinking and working, helping to consider the relationship between everything analyzed in a more accurate way. Moreover, mathematics is a learning that can improve critical thinking skills to solve problems, especially in the form of stories, so learning that can improve critical thinking skills is needed (Febriani et al, 2024). Mathematics is a discipline that can improve thinking and argumentation skills, contributing to solving everyday problems and in the world of work, so mathematics is very important to learn (Najah & Nurhalimah, 2023). This is in line with research conducted by Saptaaji et al., (2023), which stated that word wall media using blended learning can improve students' critical thinking, allowing students to learn new ideas and concepts and be more active in

expressing their ideas. This is inseparable from the majority of students who began working on test questions systematically. Students in working on test questions have shown improvement in working on questions by writing what is known and asked in the question (clarification), so that students can better understand the questions.

The emphasis on problem solving can develop students' thinking skills in analyzing questions and finding the right solutions, making it more systematic and easier for students to solve questions. The provision of Actions carried out in this second cycle aims to produce an increase in the acquisition of student understanding as a whole, referring to the completeness achieved in cycle I which has not reached its maximum potential. Furthermore, the results of student understanding in cycle II to review the success of learning on the actions given. Based on the results of the research and calculations above, it can be seen that in cycle II that has been implemented, the results obtained that students' critical thinking skills have increased. This can be seen from the classical

completeness of students in solving essay-shaped questions, namely 80.65% with 21 students who completed while students who did not complete were 5 students with a presentation of 19.35%. Then the average class score in cycle II was 78.06 with the highest score of 95 and the lowest score of 50. This indicates that the implementation of classroom action research was declared successful and there is no need to hold a next cycle. This is due to the fact that Wordwall makes students more interested in learning because it is packed with games, making learning more enjoyable. This supports the findings of previous research (Nenohai et al., 2022), which found that Wordwall media is an application used to create learning media such as quizzes and has the ability to transform them into games through gamification.

The level of student achievement in each cycle varies and is demonstrated by students' enthusiasm in paying attention to the teacher's delivery of the lesson material, their activeness in responding to questions from the teacher, and the interaction between

the teacher and students during the learning process. Likewise, the teacher's teaching methods, encouraging students to think critically in learning, use media effectively and efficiently, and manage learning in a very conducive manner. Wordwalls can be

## E. Conclusion

Based on the results of classroom action research that has been carried out at Nania Christian Elementary School, Ambon regarding the improvement of critical thinking skills in mathematics using Wordwall media in Cycle I showed 64.50% classical completion and the average obtained was 64.35, students' critical thinking skills still did not meet the minimum completion. It increased significantly in Cycle II to 80.65% classical completion with an average of 78.06. Overall, Wordwall media can improve students' critical thinking skills which have an impact on improving student learning outcomes in the learning process.

The researchers' suggestions cover several aspects. Teachers are advised to utilize the Wordwall application in learning activities to effectively achieve learning

recommended for use during the learning process. In accordance with the research findings of Funa et al. (2024), educators recommend implementing principles and approaches to improve students' conceptual understanding at various levels of elementary education.

objectives. For students, the use of this media is expected to increase interest and accuracy in completing questions. Future researchers are advised to expand the use of the Wordwall application, particularly in quizzes and question types.

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