

# The Effect of The Class of Champion Learning Model with Wordwall on Critical Thinking Skills of Grade 3 Students

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## Abstract

*Purpose:* Learning innovations that enhance critical thinking are needed because third-grade students at Trosemi 02 Public Elementary School have difficulty understanding mathematical ideas. The objective of this study is to determine the application of the Wordwall app, which is used in Clash of posts learning, and its effect on the critical reasoning skills of third-grade students at Trosemi 02 Public Elementary School.

*Methodology:* The research design used quantitative methods with a pre-experimental single-group pretest-posttest procedure. Using total sampling, 14 students were selected as research subjects. Tests, documentation, interviews, and observations were some of the methods used for data collection. Using SPSS software version 22, the data were examined using a paired sample t-test as well as validity, reliability, and normality tests.

*Results:* The results of the study indicate that the use of Wordwall with the Clash of Champions learning model has a significant impact on pupils' capacity for critical thought. The average pretest score of 73.37 rose to 85.06 on the posttest, with a significant value (Sig. 2-tailed) of  $0.000 < 0.05$ .

*Applications/Originality/Value:* Using Wordwall in conjunction with the Clash of Champions model has the potential to be an interactive teaching strategy that enhances students' critical thinking abilities. By incorporating game-based digital media into competitive learning activities, these findings offer a novel approach to learning that is applicable in the context of contemporary education.

## Introduction Section

Learning mathematics is very important in the learning process. This learning is closely related to critical thinking skills, because through this learning, students are trained to get used to completing simple steps first before finally being able to develop critical thinking skills at a more complex level (Rahmaini & Chandra, 2024). Mathematics is the foundation for developing logical, critical, and analytical thinking skills, so learning it in elementary school is very important. Through mathematics, students learn to understand basic concepts such as counting. In addition, mathematics also supports understanding in other subjects such as science and technology, and shapes attitudes of thoroughness, patience, and resistance to giving up when things get difficult. If students have a strong foundation in mathematics, they will be better prepared to continue their higher education. Students' critical, analytical, and creative problem-solving skills can be honed by presenting mathematical content that is connected to real-world problems (Salsabilla et al., 2021). Critical thinking is a more complex level of thinking through analysis and evaluation procedures. This ability includes inductive thinking skills, such as identifying connections, examining open-ended problems that have various alternative solutions, tracing cause and effect, drawing conclusions, and considering relevant data (Rachmantika & Wardono, 2019).

Critical thinking skills are understood as part of higher-order thinking skills that enable individuals to evaluate information, assess the logic of an idea, and make decisions based on rational reasoning (Budyanti & Diah Utami, 2024). Critical thinking, according to Ekeh & Venkatesamy (2023), is essential for empowering students to make their own decisions, teaching them how to solve problems independently, and building their confidence and introspective skills in facing real-life challenges. According to Nuraeni et al. (2023), critical thinking requires students to think logically, analyze, and convey ideas systematically.

The actual situation shows that a large number of elementary school students still have difficulty understanding these ideas. They tend to memorize formulas without understanding their meaning, so their capacity for critical thought has not grown optimally. This condition was also found at Trosemi 02 Public Elementary School, where third-grade students still had poor mathematics learning outcomes and did not meet the Learning Objective Achievement Criteria (KKTP) of 75. The contributing factors included conventional teaching methods, a lack of interactive media, and low student confidence

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in solving mathematics-related problems. Therefore, a more innovative and enjoyable learning approach is needed to improve students' critical thinking skills.

Among the learning models that can be applied to develop students' motivation and critical thinking skills is Clash of Champions. Clash of Champions is an educational program organized by Ruang Guru. Students will compete against each other in various brain-teasing and mentally challenging obstacles (Zalfa Naila et al., 2025). Through the application of this model, students should be able to understand the subject matter, compete in a sporting manner, and think quickly when making decisions. Research by Lestari & Darmawan (2024), proves that Clash of Champions can boost pupils' zeal and drive to learn. Compared to individual competitions, Clash of Champions (CoC) intergroup competitions aim to improve learning outcomes and motivation. Students are challenged to become champions in the Clash of Champions (CoC), which encourages healthy competition between classes and groups (Liu et al., 2022). In addition, research by Chen & Liang (2022), confirms that the Clash of Champions (CoC) is a gamification technique that encourages fun competition, increases student confidence, and encourages active learning.

To strengthen the effectiveness of the CoC model, the interactive digital media Wordwall is used. The Wordwall application offers a variety of educational games, including puzzles, quizzes, and matching games that can be accessed online. This media encourages students to actively participate, analyze data, and evaluate results, thereby directly training critical and creative thinking skills (Sari et al., 2023). Research by Kusumaningtyas & Yuniawatika (2024), shows that Wordwall can improve higher order thinking skills because it makes learning fun and stress-free for students. Similarly, research by Dwi Ristanti et al. (2025), discovered that the use of Wordwall increases acquiring motivation, enhances the participatory nature of the educational process, and strengthens elementary school pupils' comprehension of mathematical ideas.

In previous studies, the main focus was only on increasing student motivation or academic achievement in general, which made it difficult to understand how the CoC competitive learning model and Wordwall interactive digital media could support the development of critical thinking skills, especially among lower elementary school students. Therefore, combining these two approaches creates a revolutionary gamification-based learning model that is more suited to the needs of 21st-century skills, especially in enhancing critical thinking and problem-solving in mathematics learning.

The above description states that the purpose objective this research is to ascertain how the Clash of Champions model with the WordWall application can influence the critical reasoning abilities of third-grade students and to determine the effectiveness of Clash of Champions and the WordWall application in helping third-grade students at Trosemi 02 Elementary School improve their critical thinking skills.

## Methods

A single-group pretest-posttest methodology and pre-experimental design were employed in this study. This study is quantitative in nature. A methodical approach to assessment uses statistical, mathematical, or computer techniques (Sukmawati, 2024). There are several requirements for this type of pre-experimental design research, which is an experiment where the researcher uses one class with no control class in the class group, and the class used as a sample has no random selection of subjects. Pre-experimental designs are still frequently used despite their weakness in controlling external variables, due to the absence of a control group (Badriyah et al., 2024). Not so of student randomization also restricts how broadly the results may be applied because different class characteristics might exist. Given these constraints, careful interpretation of research findings is required.

A total of 14 third-grade students enrolled in the 2025–2026 academic year at SDN Trosemi 2, Gatak District, Sukoharjo Regency, became the research population. This study used non-probability sampling, which does not that every member of the population has an equal chance of being chosen for the sample (Rifa, 2021). Saturation sampling is called total sampling, which uses the entire population as the sample. This method is used because the purpose of the study is to make generalizations with the lowest level of inaccuracy, or because the population is small (less than 30 participants) (Rifa, 2021). Since this study aims to examine 14 students, all students were included in the research sample.

Interviews were used in this study to obtain data from teachers and students, observations were made while implementing the Clash of Champions learning model using the Wordwall application, pre-tests and post-tests as written tests, and documentation was taken from learning activity tools, pre-test and post-test scores, and student attendance records.

Data analysis for this study was conducted to systematically process and interpret the research data in order to receive valid conclusion. The analysis process included prerequisite tests, which comprised a reliability test using Cronbach's alpha coefficient. An instrument was considered reliable if its  $\alpha$  value was above 0.60 using SPSS version 22.00 for Windows, and a validity test, which measured the accuracy and precision of the measuring instrument in performing its measurement function (Sugiono et al., 2020). Furthermore, using SPSS version 22.00 for Windows, a normality test was carried out to ensure that the information was normally distributed, which was done before the prerequisite test for parametric statistical analysis. The t-test was run after the data met the criteria. For paired samples, the t-test was employed to statistically compare two means from the same group in two different periods (for example, before and after treatment) or from two identical conditions. This test was used as research data analysis. For this t-test, the researcher used SPSS 20.0 to compare the students' pretest and posttest results.

## Result and Discussions

### Result

Analysis of students' critical thinking abilities using pretest and posttest data after using the Wordwall application and Clash of Champions learning forms the basis of this study's findings. The study's findings are utilized to give an overview of how students' critical reasoning skills have improved. The results of the prerequisite test, hypothesis test, descriptive statistical analysis, and data quality test, including the normality test, are included in the data provided. To show how the application of the learning model affects the critical reasoning skills of third-grade students at Trosemi 02 Elementary School, all results are explained methodically.

#### A. Prerequisite Test

In this study, the test instrument must pass a prerequisite test before it can be administered to students. Therefore, to guarantee that measurement findings are consistent when the instrument is utilized, a reliability test was carried out frequently, and a validity test was used to evaluate the degree to which many test items can measure students' critical reasoning skills.

##### 1. Validity Test

To test the pretest and posttest's validity, the researcher used SPSS version 22.00 for Windows. In this validity test, students were given 15 multiple-choice questions representing three indicators. The validity test results are as follows:

**Table 1.** Description of Validity Results

No	Indicator	Question Number	Valid Question Number
1.	Without teacher assistance, students are able to gather, process, and understand knowledge on their own.	1-5	2,3,4,5
2.	Students can develop logical problem-solving techniques that are relevant to the context and reach conclusions supported by logical arguments.	6-10	6,7,8
3.	By providing valid explanations and taking responsibility for their choices or beliefs, students can also reflect on their thinking processes.	11-15	11,12,13,14

Four of the fifteen multiple-choice questions were declared invalid based on the validity test results. There were four valid questions on the first indicator. Three questions were declared valid on the second indicator. Four questions were declared valid on the third indicator. All eleven test questions were declared valid and accurately reflected students' critical reasoning abilities, according to the overall validity test results. Because each indication of critical reasoning was represented in the research instrument questions, content validity was fulfilled.

##### 2. Reability Test

The reliability test in this study aims to ascertain whether repeated questionnaire assessments produce identical or different findings. After the validity test using Cronbach's Alpha formula for multiple-choice questions and only on items that were assessed as valid, the reliability test was conducted. The researcher used SPSS version 22.00 for Windows to assess the reliability of the pretest and posttest. The reliability test calculations produced the following results:

**Table 2.** Reliability Test Results

Cronbach's Alpha	N for items
0,795	11

The reliability test's Cronbach's alpha value is 0.795. Based on the reliability coefficient, a value of 0.795 > 0.6 indicates that the research variable questions meet the criteria as a data collection tool in this study and have a high level of internal consistency.

#### B. Data Quality Test

After descriptive statistical analysis, a data quality test is conducted. Data quality test analysis is carried out to determine whether or not the gathered data is normally distributed, and whether it is suitable for use in parametric statistical tests.

### Results of the Pretest and Posttest Normality Tests

Normality tests were used to ensure that the statistics used in the distribution of the pretest and posttest was normal. Normality tests were conducted in this study. Because the number of respondents in the sample was less than 50, data analysis was performed using SPSS Statistics version 22 and the Shapiro-Wilk normality test method. The results of the pretest and posttest normality tests are as follows.

**Table 3.** Normality Test Results for Pretest and Posttest Data

	<i>Shapiro-Wilk</i>		
	<i>Statistic</i>	<i>Df</i>	<i>Sig.</i>
Pretest	0,922	14	0,235
Posttest	0,895	14	0,096

Based on Table 2, the posttest Sig. is  $0.096 > \alpha = 0.05$  and the pretest Sig. is  $0.235 > \alpha = 0.05$  because Sig.  $> 0.05$ . The pretest and posttest data are shown to be normally distributed by these normality test findings.

### C. Hypothesis Test

The data used in this study was normally distributed, and the researchers conducted parametric statistical hypothesis testing in accordance with normality testing. The paired sample t-test was the method used to evaluate the hypothesis.

#### Paired Sample t-Test

Using the Clash of Champions learning model with the Wordwall application, two samples were compared using pretest and posttest, and the researchers applied a paired sample t-test.

The following was applied to evaluate the results of the paired sample t-test:

H<sub>0</sub>: When third-grade students at Trosemi 2 Elementary School used the Wordwall application with the Clash of Champions learning approach, their critical thinking abilities remained unaffected.

H<sub>a</sub>: When third-grade students at Trosemi 2 Elementary School used the Wordwall application with the Clash of Champions learning model, their critical thinking abilities significantly improved.

Decision Criteria:

H<sub>a</sub> rejected if Sig.  $> \alpha$  (0.05)

H<sub>a</sub> accepted if Sig.  $< \alpha$  (0.05)

The SPSS result for the paired-sample t-test of the pretest and posttest scores is as follows:

**Table 4.** Hypothesis Test Results

	<i>Paired Differences</i>							
	<i>Mean</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>	<i>95% Confidence Interval of the Difference</i>		<i>t</i>	<i>Df</i>	<i>Sig (2-tailed)</i>
				<i>Lower</i>	<i>Upper</i>			
Pair 1 pretest posttest	-11.68714	7.503007	2.00528	-16.01929	-7.35500	-5.828	13	.000

Table 3's analysis results indicate that H<sub>a</sub> is accepted since the significant value is  $0.000 < \alpha$  (0.05). Therefore, it can be concluded that using the Clash of Champions learning model with the Wordwall program has a major impact on the critical thinking abilities of third-grade elementary school children at SD Trosemi 2. With a standard deviation of 7.50, the average difference between the two scores is 11.69. With a 95% confidence interval between -16.02 and -7.36, the t-test result is  $t(13) = -5.83$ ,  $\alpha < .000$ . The implementation of the Clash of Champions learning model with the help of the Wordwall application has a very strong impact on enhancing students' critical thinking abilities, as indicated by the effect size determined using Cohen's d, which is 1.56 and falls into the large effect category. All of the paired t-test's presumptions were verified and determined to be satisfied before to the analysis. The data fit the criteria for an interval scale, the pretest–posttest score differences were normally distributed, and no severe outliers were discovered. The paired t-test was deemed suitable and legitimate for use in this investigation as all of these presumptions were

satisfied. Therefore, it can be said that third-grade pupils at Trosemi 2 Elementary School significantly and meaningfully improved their critical thinking abilities when the Clash of Champions learning paradigm was applied in conjunction with the Wordwall program.

### *Results of Descriptive Statistical Analysis of Pretest and Posttest*

The Pretest and Posttest data were used to calculate the results of descriptive statistical analysis using SPSS version 22.00 for Windows, as follows:

**Table 5.** Results of Pretest and Posttest Data Analysis

	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Std.Deviation</i>
<i>Pretest</i>	14	54,55	100	73,38	12,58754
<i>Posttest</i>	14	72,73	100	85,07	9,16461

Based on Table 1, the results of data analysis illustrate how students' critical thinking skills were improved by combining the Wordwall application with the Clash of Champions learning model. In the pretest, the average score was 73.38, while in the posttest it increased to 85.07. This means that there was an increase of 11.69 points after the treatment was given. The minimum score also increased from 54.55 on the pretest to 72.73 on the posttest, while the maximum score remained at 100, indicating that some students were able to achieve optimal results after the treatment. The pretest standard deviation was 12.58754, while the posttest standard deviation was 9.16461.

## **Discussions**

### **A. *The effect of the Wordwall Application and the Clash of Champions Learning Model on Students' Critical Thinking Capabilities.***

With a significance value (Sig. 2-tailed) of  $0.000 < 0.05$ , the paired sample t-test findings indicate that the alternative hypothesis ( $H_a$ ) is accepted and the null hypothesis ( $H_0$ ) is rejected. This demonstrates how third-grade pupils at Trosemi 02 Public Elementary School's critical thinking abilities are significantly impacted by the use of the Wordwall program and the Clash of Champions learning paradigm. From 73.38 on the pretest to 85.07 on the posttest, the average pretest score rose by 11.69 points, or around 15.9%. This increase illustrates how this teaching method can support the development of students' critical thinking skills.

The results of this study show that the application of Clash of Champions to math problems encourages students to think more clearly, methodically, and reflectively. Students are more active in processing information, understanding problems, and reaching logical conclusions when interactive Wordwall games are used in conjunction with educational competition strategies. This is in line with the opinion of Adilah & Minsih (2022), who state that interactive media-based learning provides a meaningful and engaging learning environment that helps improve students' critical thinking skills. This is consistent with studies that demonstrates that the CoC model is an interactive learning approach that can promote student motivation and critical thinking, as demonstrated by enhanced learning outcomes and active student engagement.

Based on interviews with third-grade teachers at SDN Trosemi 02 prior to the intervention, it was found that students' critical thinking skills were still relatively low. Many students had difficulty converting story problems into mathematical form and often answered without thinking logically. However, after implementing the Clash of Champions model with the help of the Wordwall application, the teacher reported that students became more enthusiastic, active, and able to explain the logical reasoning behind each step of the solution. This shows a significant improvement in analytical skills and reasoning abilities. Research conducted by Mandarsari et al. (2024), states that the Wordwall application is able to stimulate thinking, improve logic, and create interactive learning. Furthermore, according to Ernawati & Rahmawati (2022), meaningful learning not only transfer theory but also develops thinking skills to solve real problems. Thus, the combination of the Clash of Champions model and Wordwall is effective in developing students' critical reasoning skills.

Based on interviews with three students who said that learning activities became more enjoyable because they were packaged in the form of games and competitions. Students feel challenged to compete in a healthy manner and are more enthusiastic about completing problems. Satriagung Ganesha et al. (2025) found that by fostering a positive competitive atmosphere, the Clash of Champions learning model can increase student engagement, learning motivation, and critical thinking skills.

Thus, statistical test results showing a significant increase in scores, reinforced by observations and interviews, indicate that the Clash of Champions learning model with the Wordwall application can help elementary school students develop their critical thinking skills. Students have the opportunity to solve math problems more rationally, analytically, and reflectively thanks to this competition-based and technology-based learning.

## **B. *The Effectiveness of Using the Clash of Champions Learning Model with the Wordwall Application in Improving Students' Critical Thinking Skills.***

The results of the study also show how effective the Wordwall application and Clash of Champions learning are in helping pupils enhance their critical thinking abilities. The average pretest scores of the kids increased significantly from 73.38 to 85.07 on the posttest, or an increase of 11.69 points, or about 15.9%. In addition to increasing students' motivation and confidence during the learning process, this also shows a shift in learning behavior towards more active learning.

Based on the results of observations, teachers can effectively build a good learning environment that is also competitive. Students actively participate in activities, engage in discussions, and are brave enough to express their opinions and explain the reasons behind their answers. The Clash of Champions model provides every student with the opportunity to participate fully, both individually and in groups, making them feel valued and inspired to demonstrate their best abilities. The healthy competitive element in this model has been proven to increase students' confidence, responsibility, and independence in learning.

The integration of the Wordwall application into learning activities also strengthens the effectiveness of this model. Through game features such as quizzes, matching games, and crosswords, students are guided to solve problems quickly and accurately. This process requires students to analyze information, compare answers, and make logical decisions based on their comprehension of the ideas. This is in line with the findings of Kusumaningtyas & Yuniawatika (2024), who state that through entertaining interactive activities, Wordwall-based learning can make students better prepared to tackle higher-order thinking skills (HOTS) math problems. In this study, in order to increase student engagement and comprehension of the subject matter being taught, interactive learning activities are developed using game-based learning models like Coc.

The teacher also said that after implementing this model, students were more enthusiastic and focused in learning activities. The learning atmosphere, which took the form of a competition, made students compete to be the best group. This condition is in line with the research by Lampropoulos & Sidiropoulos (2024), which explains that the gamification approach in learning can increase students' intrinsic motivation and strengthen social cooperation and group responsibility. From a character and socio-emotional perspective, the implementation of the Clash of Champions model also has a positive impact. Students become more sportsmanlike, respect each other, and are able to accept defeat and victory gracefully. Cooperation within groups helps students support each other and build solidarity. This improves learning outcomes and helps students develop moral character and social values. According to research by Susanti & Darmansyah (2023), collaborative and competitive learning can improve concentration and higher-level cognitive abilities. The cooperative and competitive components of the Clash of Champions model can help students develop self-confidence and a sense of ownership over their education.

Thus, it is evident from test results, interviews, and observations that third-grade students at Trosemei 02 Public Elementary School can effectively develop their critical thinking skills by using the Clash of Champions learning model in conjunction with the Wordwall program. This strategy is able to create meaningful, interactive learning that is focused on fostering students' critical thinking abilities by balancing aspects of competition, technology, and teamwork.

## **Conclusion**

The use of the Clash of Champions learning model with the Wordwall application significantly improved the critical reasoning abilities of third-grade students at Trosemei 02 Public Elementary School according to result research. With a significant value (Sig. 2-tailed) of  $0.000 < 0.05$ , the paired sample t-test findings indicated that the alternative hypothesis ( $H_a$ ) was accepted.

The use of interactive Wordwall media combined with Clash of Champions learning increases student motivation, engagement, and critical thinking skills during the learning process. The mean score between the pretest and posttest increased from 73.38 to 85.07, with students' scores increasing by 11.69 points, or more than 15.9%. This shows that students' skills were successfully improved through the learning model. Thus, this learning model is effective in helping students think logically, analyze problems, and provide the correct reasoning for each mathematical problem solution.

The application of this learning concept creates a dynamic, competitive, and entertaining learning environment. Students gain confidence, the courage to voice their opinions, and the ability to support their responses with reasoned arguments. In addition, Wordwall is used to make learning more interesting and beneficial for students in thinking critically and quickly when solving challenges. To enhance elementary school pupils' critical thinking abilities, especially in mathematics, the clash of champions model can be used with the help of Wordwall as an alternative creative teaching method. Teachers can enhance students' knowledge, abilities, and learning motivation by using interactive learning models. Additionally, teachers can improve students' cognitive and psychomotor skills by using a range of learning mediums.

Based on these conclusions, the recommendation for further research is to conduct comparative studies on different materials and levels in order to expand the findings and improve the quality of education on an ongoing basis. There was

no student randomization in this trial because there was no control class. To get more solid evidence, it is advised that future research employ an experimental design including a control group and participant randomization.

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## References

- Adilah, A. N., & Minsih, M. (2022). Pengembangan Media Pembelajaran Monokebu pada Siswa Sekolah Dasar. *Jurnal Basicedu*, 6(3), 5076–5085. <https://doi.org/10.31004/basicedu.v6i3.3026>
- Badriyah, F. N., Wicaksono, A. G., & Jumanto. (2024). Pengaruh Model Pembelajaran Problem Based Learning terhadap Keterampilan Menulis Peserta Didik Kelas II SD Negeri Madyotaman Surakarta Pada Mata Pelajaran Bahasa Indonesia Tahun Ajaran 2023/2024. *Jurnal Pendidikan Tambusai*, 8(1), 14214–14221. <https://doi.org/10.47827/jer.v5i4.480>
- Chen, J., & Liang, M. (2022). Play Hard, Study Hard? The Influence of Gamification on Students' Study Engagement. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.994700>
- Dwi Ristanti, M., Puspitoningrum, E., & Karimatussalamah, S. (2025). Implementasi Media Pembelajaran Wordwall untuk Meningkatkan Hasil Belajar Peserta Didik pada Mata Pelajaran Bahasa Indonesia Kelas III SD Negeri Banjaran 1 Kota Kediri. *Jurnal Pendidikan UNIGA*, 19(1), 73–83. [www.journal.uniga.ac.id](http://www.journal.uniga.ac.id)
- Ekeh, M. C., & Venketsamy, R. (2023). Enhancing Early Grade Learners' Critical Thinking Skills for Self-Reliance. *Profesi Pendidikan Dasar*, 72–81. <https://doi.org/10.23917/ppd.v10i1.4355>
- Ernawati, Y., & Rahmawati, F. P. (2022). Analisis Profil Pelajar Pancasila Elemen Bernalar Kritis dalam Modul Belajar Siswa Literasi dan Numerasi Jenjang Sekolah Dasar. *Jurnal Basicedu*, 6(4), 6132–6144. <https://doi.org/10.31004/basicedu.v6i4.3181>
- Kusumaningtyas, A. W., & Yuniawatika, Y. (2024). Pengaruh Wordwall Game-Based Learning terhadap Higher Order Thinking Skills. *Metodik Didaktik*, 20(1), 62–73. <https://doi.org/10.17509/md.v20i1.69910>
- Lampropoulos, G., & Sidiropoulos, A. (2024). Impact of Gamification on Students' Learning Outcomes and Academic Performance: A Longitudinal Study Comparing Online, Traditional, and Gamified Learning. *Education Sciences*, 14(4). <https://doi.org/10.3390/educsci14040367>
- Lestari, R. A., & Darmawan, P. (2024). Analisis Dampak Game Show Clash of Champions terhadap Motivasi Belajar di Kalangan Gen-Z. *Fitrah: Jurnal Studi Pendidikan*, 15(2), 135–151. <https://doi.org/10.47625/fitrah.v15i2.795>
- Liu, Y. J., Zhou, Y. G., Li, Q. L., & Ye, X. D. (2022). Impact Study of the Learning Effects and Motivation of Competitive Modes in Gamified Learning. *Sustainability (Switzerland)*, 14(11). <https://doi.org/10.3390/su14116626>
- Mandarsari, P. & Wonomulyo, Y. (2024). Sosialisasi Pemanfaatan Media Pembelajaran Wordwall bagi Para Guru Bahasa Inggris. *Communnity Development Journal*, 5(4), 8284-8287. <https://journal.universitaspahlawan.ac.id/index.php/cdj/article/view/34036>
- Nuraeni, W., Ermawati, D., & Riswari, L. A. (2023). Analisis Kemampuan Bernalar Kritis melalui Motivasi Belajar Matematika dalam Kurikulum Merdeka. *Jurnal Edumath*, 9(2), 117–124. <https://doi.org/10.52657/je.v9i2.2099>
- Rachmantika, A. R., & Wardono. (2019). Pengaruh Model Pembelajaran Problem Based Learning Terhadap Kemampuan Berpikir Kritis Siswa SD pada Muatan IPA. *PRISMA, Prosiding Seminar Nasional Matematika*, 439–443.
- Rahmaini, N., & Chandra, S. O. (2024). Pentingnya Berpikir Kritis Dalam Pembelajaran Matematika. *Maret 2024 Journal of Mathematics Education and Application*, 4(1). <https://mathjournal.unram.ac.id/index.php/Griya/indexGriya>
- Rifa, O. H. (2021). *Metodologi Penelitian*. Yogyakarta : SUKA-Press UIN Sunan Kalijaga.

- Salsabilla, I. & Hidayati, Y. M.(2021). Kemampuan Literasi Matematika Siswa Kelas V dalam Menyelesaikan Soal Matematika Tipe Higher Order Thinking Skills (Hots). *JKPD) Jurnal Kajian Pendidikan Dasar*, 6(1). <https://doi.org/10.26618/jkpd.v6i1.3948>
- Sari, R. M., Rusnilawati, R., & Ali, S. R. (2023). Flipped Learning with Nearpod Media: Enhancing Digital Learning Outcomes in Primary Mathematics. *Profesi Pendidikan Dasar*, 159–173. <https://doi.org/10.23917/ppd.v10i2.4511>
- Satriagung Ganesha, F., Ahmad Smaragdina, A., Dwi Rizky, D., Gallih Maulana, H. (2025). Peningkatan Minat Belajar Informatika SMP melalui Penerapan Game Class of Champions-ShareAlike 4.0 International (CC BY-SA 4.0). In *Indonesian Research Journal on Education Web Jurnal Indonesian Research Journal on Education* (Vol. 5). <https://irje.org/index.php/irje>.
- Sugiono, Noerdjanah, & Wahyu, A. (2020). Uji Validitas dan Reliabilitas Alat Ukur SG Posture Evaluation. *Jurnal Keterampilan Fisik*, 5(1). <https://doi.org/10.37341/jkf.v5i1.167>.
- Sukmawati, A. S. (2024). *Metodologi Penelitian*. Bandung : Media Sains Indonesia.
- Susanti, A., & Darmansyah, A. (2023). Analisis Strategi Penguatan Profil Pelajar Pancasila Dimensi Bernalar Kritis di SD Negeri 44 Kota Bengkulu. *Edubase : Journal of Basic Education, Volume 4 Nomor 2 (2023) Pages 201-212* . <http://journal.bungabangsacirebon.ac.id/index.php/edubase/article/view/1027>
- Zalfa Naila, L., Hariyanti, U., & Rahman, K. (2025). Analisis Pengaruh Program Edukatif Clash of Champions Terhadap Motivasi Belajar Siswa SMKN 2 Kota Malang (Vol. 9, Issue 3). <http://j-ptiik.ub.ac.id>