



The effect of using Quizlet in improving critical thinking skills for fifth-grade students at SDN Sayabulu

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Abstract

This research was conducted to see the effect of Quizlet on the critical thinking skills of fifth graders at SDN Sayabulu. Initially, the researchers interviewed the homeroom teacher and one of the fifth-grade students of SDN Sayabulu where the teacher's learning process was more often taught using conventional methods with the help of book media; students' interest in learning can be reduced because one of the media is less varied. From the interview result, researchers used alternative learning media Quizlet with flashcards, test, and write features so that students could understand, analyze, identify, and evaluate questions. Researchers used a quantitative method in the form of a one-group pre-test and post-test to compare the critical thinking of fifth-grade students at SDN Sayabulu before and after treatment with Quizlet in one group or class. The results of the study using Quizlet for learning media showed a significant increase; this was in the calculation of the paired sample t-test with the results of the significant value, meaning that the learning media was accepted, and Quizlet improved critical thinking of students' class V SDN Sayabulu.

Keywords: Critical thinking; learning media; Quizlet

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1. INTRODUCTION

The development of more up-to-date and sophisticated learning media will make learning activities more efficient and effective. Learning activities in the classroom and at home using interactive, and interesting learning media will make students more motivated in learning. Anderson (as cited in Sari et al., 2016) states that when a student can think about how to interpret an idea from a teaching material in written, oral, or graphic form, weigh things based on their knowledge, and integrate new knowledge. Known in the concept of student thinking so that it can be said that the student can think critically about himself. According to Sihotang (Yudiana, 2015), Critical thinking can be referred to as a skill to understand something logically and clearly so that students can understand a problem and solve the best answer to the problem they face (Chiu & Hwang 2024; Dissen, 2023). Critical thinking is part of self-discipline, self-will, and how to think to communicate and make decisions more effectively.

According to Normaya (2015), critical thinking is a way of thinking rationally in measuring something before making a decision or performing a behavior, to carry out taking as much information as possible on it. The low critical thinking of students is caused because the learning process is still dominated by rote so it has an impact on learning outcomes. Low learning results indicate that students' critical thinking skills are still low (Hamdani et al., 2019; Monteleone et al., 2023).

Based on the idea from UNESCO, cited by Sapounidis et al., (2024) 4 abilities should exist in a 21st-century student. The four abilities are shortened to 4C which consists of Critical Thinking, Communication, Creativity, and Collaboration. One of the abilities that will be studied is the ability of students in Critical Thinking or critical thinking (Nurjanah, 2019).

In 2000 Indonesia began participating in the Program for International Student Assessment commonly abbreviated as PISA, and in 2018 the results of the PISA Indonesia survey ranked at the bottom level, namely ranking three from the bottom on critical thinking skills. In addition, Indonesia's scientific ability is ranked 9th from the bottom with a value of 396. The value of Indonesia's scientific ability is below and very far from the average because in OECD (Organization for Economic Cooperation and Development) countries, the average value of scientific ability is 489 (Scheicher, 2019).

1.1. Conceptual background

Based on interviews with fifth-grade students and teachers of SDN Sayabulu, several problems occurred in learning activities, because teachers rarely use learning media, especially in the form of technology, teachers more often teach using conventional methods with the help of thematic book media. The media and learning models that are applied are less varied which makes students' interest in learning decrease it can affect the development of students' critical thinking. One of the reasons is that teachers are less adaptable to technology and lack introduction to the latest learning media, and professional identity, besides that the facilities and infrastructure are also lacking in supporting teachers to develop and apply learning media (Ding et al., 2022).

From the results of these interviews, researchers used an alternative learning media, namely Quizlet. Quizlet itself consists of several features such as flashcards, tests, and writing so that students can understand, analyze, identify, and provide answers to challenging questions or questions that require analysis and evaluation. According to Zaki & Yusri (2020), Learning media is a message-carrying technology that can be used for learning purposes. Learning media is a physical means to deliver learning content/materials such as books, films, videos, and so on. Learning media is a means of communication in the form of print and views which includes hardware technology.

Quizlet is available on Android and iOS; the application is online-based. And has several features such as learning, flashcards, spelling, writing, match, test, live, and gravity. According to Sari (2019),

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Quizlet is an ideal online-based learning platform for students at every level of education and in various subjects, not limited by language learning. In addition, this learning media can be used with smartphones or computers without limitations of place and time. The learning activities carried out can be more varied and fun using Quizlet with various supporting features so that the learning process is not rigid, flexible, and challenging. The results of previous research conducted by Lindayani (2021) showed that the application of Quizlet application on average got a value exceeding the Minimum Completeness Criteria (KKM), this proves that providing evaluations using the Quizlet application can channel a good understanding so that students can gain knowledge according to learning objectives (Ma, 2024).

1.2. Purpose of study

Following the previous elaboration, then the researcher was encouraged to research the effect of using Quizlet learning media in improving the critical thinking of fifth graders at SDN Sayabulu. Quizlet learning media is expected to be able to make solutions in interesting learning activities so that they can train and improve students' critical thinking.

2. METHODS AND MATERIALS

2.1. Participants

The research was conducted at SDN Sayabulu, which is located on Jl. Sayabulu, Serang City, Banten Province, with the research time in May 2022. The study population consisted of 42 students of class V at SDN Sayabulu, of which 38 students were sampled with probability sampling calculations. The research method used is a quantitative method with the type chosen, namely pre-experimental design in the form of one group pre-test post-test to compare the critical thinking abilities of students at SDN Sayabulu class V before and after treatment with Quizlet learning media contained in one group or class.

2.2. Data collection tool

In this study, the student's knowledge (cognitive) test instrument in written form was used as a measuring tool that was influenced by the assessment. In a written cognitive test in the form of a description of 10 questions, students can provide free answers using student worksheets. The test was given twice to students, the first test was given before the treatment and the second test was carried out after the treatment. The critical thinking ability indicator used is based on the theory of Robert H. Ennis (Ulfa, 2021) with five indicators, namely being able to answer challenging questions, analyze arguments, make conclusions, and solve problems.

The instrument is in the form of a critical thinking ability description test, then a construction validity test is carried out (Construct Validity). The construct validity test is based on certain theories that are tested by an expert (Sugiyono, 2019). The research instrument was tested by one of the teachers as well as the homeroom teacher of class V at SDN Sayabulu (table 1), besides that, a validity test was also carried out on the media and materials to be used with the Quizlet media which was carried out by a class VI teacher at SDN Sayabulu. After the validity test was carried out, the research instrument was then analyzed by using a reliability test using the Cronbach Alpha formula.

When testing the Cronbach Alpha formula on the research instrument, the researcher used SPSS version 25 software, so the following values were obtained.

Table 1
Reliability test result

Reliability Statistics	
Cronbach's Alpha	N of Items

,797	10
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The reliability test results obtained to get a value of 0.797 then based on the reliability criteria these results can be included in the high category so that the instrument to be used is reliable and feasible to use.

2.3. Data analysis

After getting data using valid and reliable instruments, it is necessary for data analysis, data analysis in this study uses inferential statistical analysis with the help of Software Product and Service Solution (SPSS) version 25 to analyze the normality test and the paired sample t-test. A normality test is used to determine whether the analyzed data is normally distributed or not. Meanwhile, a paired sample t-test was used to compare the pre-test and post-test scores of fifth-grade students at SDN Sayabulu before and after being given treatment using Quizlet learning media from one subject or one class. However, if the data are not normally distributed, the hypothesis test that will be used to measure the pre-test and post-test data is using the Wilcoxon signed rank test. Decision-making on hypothesis testing on the paired sample t-test is based on probability, namely:

Ho is accepted and Ha is rejected if significant > 0.05

Ho is rejected and Ha is accepted if significant < 0.05

The research procedure is carried out based on several steps, starting with a pre-test to see the initial competency values that students already have, after they do treatment or treatment using the Quizlet learning media, and after that, they are given the final stage with a post-test after the treatment step so that researchers can find out the value of students' abilities after using Quizlet media.

3. RESULTS

The findings contain data that is then analyzed utilizing normality tests and hypothesis testing. The normality test used is the Shapiro-Wilk formula followed by the Paired Sample t-test. The research site is located at SDN Sayabulu Serang City from May 24 – May 30, 2022, with the research population consisting of 42 students. Researchers conducted experiments on how Quizlet media can improve students' critical thinking. The learning material given to class V students is about changes in the shape of objects on the theme of 7 Events in Life which had previously been studied by class V students at SDN Sayabulu.

Researchers formulate and make research instruments, namely 10 description test questions which are then tested on samples based on the material, namely changes in the shape of objects. After getting the data, the normality test was used to analyze the data and to determine whether the data were normally distributed, then test the hypothesis to find out whether the average was different before and after the application of Quizlet media. All of these tests, both normality testing and hypothesis testing, used SPSS version 25 for Windows to help analyze the data. The display of the Quizlet media that is applied to students is shown as shown below (figure 1, figure 2).

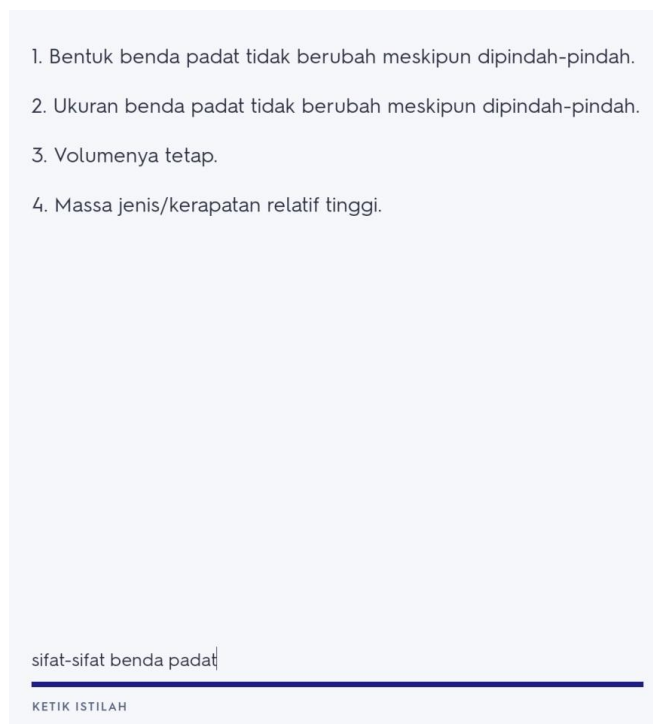
Figure 1

Display of the flashcard feature

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Figure 2
Display of the essay feature on the Quizlet media



The experimental research steps were carried out as follows:

1. They took the initial data in the form of a pre-test to determine the initial condition of the research sample.
2. After the researcher obtained the results of the pre-test, the researcher gave treatment to the fifth-grade students using the *Quizlet learning media*. Was *The treatment* given 3 times and after completing the *treatment*, the researcher conducted a post-test or final test on the research sample.
3. Researchers conducted parametric statistical tests which were then analyzed and interpreted to conclude the formulation of research problems.

The results of the study came from the test data of the fifth-grade students of SDN Sayabulu before and after using the media, the data can be seen in table 2.

Table 2
Data description critical thinking ability value

Description	Pre-test	Post-test
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Number of students	38	38
Minimum score	26	36
score Maximum	70	92
Mean	44.63	69.95
Standard Deviation	12.198	15.397

Pre-test statistical data with a sample of 38 students contained a minimum value is 26, a maximum value is 70, a mean is 44.63, and a standard deviation is 12.198. Meanwhile, the post-test score has the lowest score of 36, the highest value of 92, and the mean is 69.95, with a standard deviation of 15.397.

After obtaining the data, the researcher processed and analyzed the data findings with the help of SPSS version 25 software. In this study, the researcher wanted to answer the formulation of the problem regarding critical thinking skills by implementing the use of Quizlet learning media for the fifth-grade students of SDN Sayabulu. Parametric analysis of data in the form of a paired sample t-test is needed to examine differences in students' critical thinking abilities after and before using Quizlet media. However, before testing the hypothesis, a normality test is needed to determine the use of the formula in the next data analysis.

This test is used to determine the research data on a sample of 38 students with a normal or abnormal distribution. Several assumptions determine the results of the data normality test, namely H_0 if the data is normally distributed, while H_a if the data is not normally distributed.

The significance level used in the normality test is 5%, assuming if the significance is more than 5% then H_0 is accepted, but if the significance is not more than 5% then H_0 is rejected.

The data analysis used is Shapiro Wilk in testing normality because the sample data used is less than 50 or $n < 50$, in this normality test phase the researcher uses SPSS version 25 software and obtains the following values (table 3).

Table 3
Normality test results

Description	Sig	
Pretest	0.221	normal
Post-test	0.108	normal

The results on the above values show that the pre-test data has a significance of 0.221, then the post-test data has a significance of 0.108. The results of the data that have been tested for normality exceed the significance level, so it can be said that H_0 is accepted, which means that the data obtained by the researcher is said to be normally distributed. After the data is analyzed and normally distributed or meets the requirements, then the parametric hypothesis test can be continued, namely the paired sample t-test.

Hypothesis testing is used to determine the differences in students' critical thinking before and after the application of Quizlet media. Previously, the normality test was carried out with the results of the data being normally distributed so that the prerequisite tests were met, then the hypothesis

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test would use the paired sample t-test formula using SPSS version 25 software so that the test values were as follows (Table 4).

Table 5
Hypothesis test results paired sample T-test

Description	Pretest-Posttest
Mean	-25,316
Std. Deviation	9,372
t	-16,651
df	37
Sig. (2-tailed)	0.000

From the table above, the value of Sig. (2-tailed) is 0.000 which is less than the significance level of 0.05 or it can be said to be $0.000 < 0.05$. Based on this, the research hypothesis assumes that H_a is accepted while H_0 is rejected or it can be said that there is a difference in the value of students' abilities in critical thinking before and after using Quizlet media.

To the results of the analysis of the thinking ability improvement test above, then H_a can be accepted or the Quizlet learning media affects the critical thinking of the fifth-grade students of SDN Sayabulu. According to the results of hypothesis testing, it can be said that the use of Quizlet learning media improves students' critical thinking.

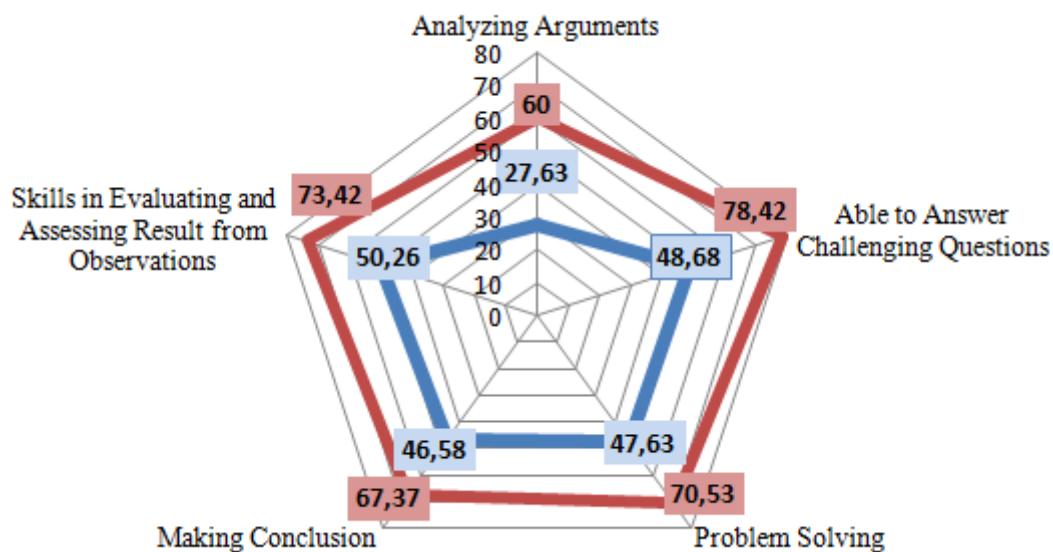
4. DISCUSSION

This research was conducted to see whether the use of Quizlet learning media was effective in improving students' critical thinking. The location of this research is at SDN Sayabulu and involves one class, namely class V students.

Before treatment for class V using Quizlet media, students fill out pre-test questions about changes in the shape of objects that have previously been studied to get students' initial critical thinking skills. After the pre-test (initial test), the fifth-grade students were given treatment three times using the Quizlet learning media. The final step is that students fill out post-test questions to get the final score after giving treatment to students.

This study uses five critical thinking indicators, after conducting research and analyzing it, it can be seen that all of these indicators have an increase before and after treatment. These events are interpreted in Figure 3.

Figure 3
Average results of critical thinking indicators



Based on the table of average results of students' critical thinking indicators, it appears that the average results of critical thinking skills indicators from the pre-test with a blue axis and post-test with a red axis, the critical thinking indicators used are 5 indicators with different results. The "Analyzing Arguments" indicator consists of several sub-indicators, namely "analyzing story illustrations and pictures about various types and properties of gas, solid, and liquid objects" and the sub-indicator "analyzing the effect of heat on changes in the shape of objects through charts". The indicator "analyzing arguments" obtained a score at the pre-test of 27.63 and increased during the post-test with a value of 60 with a difference increase of 32.37. It can be seen in the picture of the critical thinking indicator "analyzing arguments" with the red axis located higher than the blue axis, which means that there is an increase in students' ability to analyze arguments. This indicator gets the highest increase compared to other indicators, and it can be seen in the learning process that students are very interested in using the flashcard feature on Quizlet media because there are pictures.

In the indicator "Able to Answer Challenging Questions" there is a sub-indicator of critical thinking, namely "connecting the influence of heat on changes in the shape and temperature of objects in everyday life" which consists of 2 questions. The indicator "able to answer challenging questions" obtained a score of 48.68 while the post-test score was 78.42 with a difference of 29.74 increases. This indicator can be categorized as getting a high improvement, and it can be seen in the learning process that students can understand and work on questions with the help of the test feature on the Quizlet learning media which contains questions in the form of true-false, essays, and multiple choice on material change shape and the nature of things.

ts can understand and work on questions with the help of the test feature on the Quizlet learning media which contains questions in the form of true-false, essays, and multiple choice on material change shape and the nature of things.

Furthermore, in the "Problem Solving" indicator there is a critical thinking sub-indicator, namely "solving problems in the surrounding environment related to the influence of heat on changes in the shape and temperature of objects in everyday life" which consists of 2 questions. The indicator "solve the problem" gets a pre-test value of 47.63 while the value obtained in the post-test is an average of 70.53 and the difference in increase is 22.9.

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The "Making Conclusions" indicator contains critical thinking sub-indicators, namely "summarizing the properties of gas, solid, and liquid objects from daily life description stories" which consists of 2 questions. In the indicator "making conclusions" it appears that the pre-test value is 46.58 while the post-test value is higher with the number 67.37 with a difference increase of 20.79. Indicators making conclusions fall into the category of increasing lowest, even in the learning process students still do not understand and are still hesitant in terms of concluding the material. This is related to how students can conclude material changes in the form and properties of objects from learning outcomes using Quizlet's media features.

o not understand and are still hesitant in terms of concluding the material. This is related to how students can conclude material changes in the form and properties of objects from learning outcomes using Quizlet's media features.

The indicator "Skills in Evaluating and Assessing Results from Observations" has a sub-indicator of critical thinking, namely "comparing the small amount of heat in changes in the form and temperature of the object produced" which consists of 2 questions. The indicator "skills in evaluating and assessing the results of observations" obtained a pre-test score with a mean of 50.26 while the post-test obtained a higher result of 73.42 with a difference of 23.16.

n evaluating and assessing the results of observations" obtained a pre-test score with a mean of 50.26 while the post-test obtained a higher result of 73.42 with a difference of 23.16.

According to the above description of the increase in each indicator, the indicator category with the highest increase is the "Analyzing Arguments" indicator while the indicator category with the smallest increase is the "Making Conclusions" indicator. The increase in average is a good thing because students can understand the material well on the concepts that have been applied, especially in critical thinking. This condition can ensure that the use of Quizlet learning media influences and makes improvements in critical thinking in learning. Likewise, with the use of Quizlet media in learning activities about changing the shape of objects, students are interested and enthusiastic about asking, understanding, and giving opinions on the learning provided to improve students' critical thinking.

The research results that have been described previously are also supported by relevant previous studies. The results of research by Lindayani & Artawan (2021) regarding the use of the Quizlet application in evaluation activities, with the results of the study the average score is above the KKM (Minimum Completeness Criteria). Responses from the results of using the Quizlet application make learning outcomes more quality in a learning process and students can answer well the questions that have been studied previously so that learning objectives are achieved. The results of Lindayani & Artawan's (2021) research support the results in this study where the average results after treatment increased compared to before treatment.

Other previous studies that support the results of the study are researched by Nurrochmah & Benardi (2021) regarding the use of the Quizlet application with PowerPoint to find out the difference in learning outcomes after treatment. When comparing the experimental class learning outcomes data using Quizlet Live learning media, there are differences in learning outcomes. Data analysis was carried out using the t-test formula and obtained a sig value of $0.000 < 0.05$, therefore it can be concluded that H_a is accepted, as seen from the average value of the pre-test with the acquisition of 52.78, and the percentage of completeness as much as 13.8%, while the post-test has a 91.67% completeness percentage and an average value of 76.81. The results of Nurrochmah & Benardi's (2021) research support the results of the research that the researchers did were the results by using the t-test formula and obtaining results with $0.000 < 0.05$, it was concluded that H_a was accepted, with a post-test mean of 69.95, a higher than the pre-test value of 44, 63.

The last relevant research that supports the results of this study is the research conducted by Muryani (2021) regarding the effect of the Kahoot media-assisted inquiry model on critical thinking

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skills. Based on the results of Muryani's research, there is a significant difference with a value of $0.017 < 0.05$ then H_a is accepted and H_o is rejected, then there is an influence of the inquiry learning model assisted by Kahoot media on students' critical thinking skills. This supports the results of this study, where there is a significant difference with a value of $0.000 < 0.05$, so there is an effect of using Quizlet in improving students' critical thinking skills.

improving students' critical thinking skills.

The next previous research that supports this research is research from Arif (2022) regarding the use of Quiziz media tools in developing students' critical thinking. According to the results of research from Arif, the use of Quiziz learning media with crossword puzzles or crossword puzzles can create a positive attitude, especially in thinking critically in the e-learning learning process, so that it can train students' memory of learning materials. This supports this study, where there was a significant increase after treatment with Quizlet media.

5. CONCLUSION

Based on the data analysis that has been carried out so that it can be concluded and obtained the value of Sig. (2-tailed) is 0.000 which is less than the value of the significance level 0 0.05 or it can be said $0.000 < 0.05$ while the increase occurred in the mean after treatment with a value of 69.95 compared to before treatment with a value of 44.63. Based on this, the research hypothesis assumes that H_a is accepted while H_o is rejected or it can be said that there is a difference in the value of students' abilities in critical thinking before and after using Quizlet media.

According to the results of the analysis of the thinking ability improvement test above, then H_a can be accepted or the Quizlet learning media affects the critical thinking of the fifth-grade students of SDN Sayabulu. According to the results of hypothesis testing, it can be said that the use of Quizlet learning media improves students' critical thinking. There is also an increase in each indicator, the indicator category with the highest increase is the "Analyzing Arguments" indicator while the indicator category with the smallest increase is the "Making Conclusions" indicator.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Approval: The study adheres to the ethical guidelines for conducting research.

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REFERENCES

- Arif, J. R., Faiz, A., & Septiani, L. (2022). Penggunaan Media Quiziz Sebagai Sarana Pengembangan Berpikir Kritis Siswa. *Edukatif: Jurnal Ilmu Pendidikan*, 4(1), 201-210. <https://edukatif.org/index.php/edukatif/article/view/1804>
- Chiu, M. C., & Hwang, G. J. (2024). Enhancing students' critical thinking and creative thinking: An integrated mind mapping and robot-based learning approach. *Education and Information Technologies*, 1-34. <https://link.springer.com/article/10.1007/s10639-024-12752-6>
- Ding, F., Liu, X., Amin Abdalla, A., Latif Khan, M., & Akram, F. (2022). The link between English foreign language teachers' professional identity and their critical thinking that leads to teacher's success in the Chinese context: Leaders motivational language as a moderator. *Frontiers in Psychology*, 13, 983215. <https://www.frontiersin.org/articles/10.3389/fpsyg.2022.983215/full>
- Dissen, A. (2023). A critical issue: assessing the critical thinking skills and dispositions of undergraduate health science students. *Discover Education*, 2(1), 21. <https://link.springer.com/article/10.1007/s44217-023-00044-z>
- Hamdani, M., Prayitno, B. A., & Karyanto, P. (2019). Meningkatkan kemampuan berpikir kritis melalui metode eksperimen. In *Proceeding Biology Education Conference: Biology, Science*,

- Parlina, E., Sutarjo, A. & Hanif, M. (2024). The effect of using Quizlet in improving critical thinking skills for fifth-grade students at SDN Sayabulu. *International Journal of Learning and Teaching* 16(3), 157-167. <https://doi.org/10.18844/ijlt.v16i3.9466>
- Environmental, and Learning*, 16(1), 139-145. <https://jurnal.uns.ac.id/prosbi/article/view/38412>
- Lindayani, N. W., & Artawan, G. (2021). Penggunaan Aplikasi Quizlet Dalam Kegiatan Evaluasi Pembelajaran Surat Pribadi dan Surat Dinas pada Siswa Kelas VII di SMP Negeri 10 Denpasar. *Jurnal Pendidikan Bahasa dan Sastra Indonesia*, 386–394. Diambil dari <https://ejournal.undiksha.ac.id/index.php/JJPBS>
- Ma, X. (2024). Enhancing language skills and student engagement: investigating the impact of Quizlet in teaching Chinese as a foreign language. *Language Testing in Asia*, 14(1), 5. <https://link.springer.com/article/10.1186/s40468-024-00275-3>
- Monteleone, C., Miller, J., & Warren, E. (2023). Conceptualising critical mathematical thinking in young students. *Mathematics Education Research Journal*, 35(2), 339-359. <https://link.springer.com/article/10.1007/s13394-023-00445-1>
- Muryani, A., & Purwanti, K. Y. (2021). Pengaruh Model Inkuiri Berbantuan Media Kahoot Terhadap Kemampuan Berpikir Kritis Siswa Kelas IV. *JANACITTA*, 4(1). <https://jurnal.unw.ac.id/index.php/janacitta/article/view/910>
- Normaya, K. (2015). Kemampuan Berpikir Kritis Siswa Dalam Pembelajaran Matematika Dengan Menggunakan Model Jucama Di Sekolah Menengah Pertama. *EDU-MAT Jurnal Pendidikan Matematika*, 92–104.
- Nurjanah, S. A. (2019). Analisis kompetensi abad-21 dalam bidang komunikasi pendidikan. *Gunahumas*, 2(2), 387-402. <https://ejournal.upi.edu/index.php/gunahumas/article/view/23027>
- Nurrochmah, A. I., & Benardi, A. I. (2021). Perbedaan Hasil Belajar Menggunakan Media Quizlet dengan Powerpoint Pada Materi Pokok Atmosfer Kelas X SMA N 16 Semarang. *Edu Geography*, 9(2), 105-111. <https://journal.unnes.ac.id/sju/edugeo/article/view/48772/19655>
- Sapounidis, T., Rapti, S., & Vaiopoulou, J. (2024). Effects of Educational Robotics on Kindergarteners' Collaboration, Communication, Critical Thinking, and Creativity: A Meta-Analysis. *Journal of Science Education and Technology*, 1-15. <https://link.springer.com/article/10.1007/s10956-024-10149-1>
- Sari, A. L. R., & Parno & Taufiq, A. (2016). Kemampuan berpikir kritis dan pemahaman konsep fisika siswa sma pada materi hukum Newton. In *Prosiding Seminar Nasional Pend. IPA Pascasarjana Universitas Negeri Malang*.
- Sari, D. E. (2019). Quizlet: aplikasi pembelajaran berbasis smartphone era generasi milenial. *Jurnal Pendidikan Ilmu Sosial*, 29(1), 9-15. <https://journals.ums.ac.id/index.php/jpis/article/view/8150>
- Scheicher, A. (2019). *PISA 2018 Insight and Interpretations*. OECD. Diambil dari
- Sugiyono, P. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta, cv.
- Ulfa, N. (2021). *Pengaruh Media Pembelajaran Video Terhadap Kemampuan Berpikir Kritis Siswa Sekolah Dasar PAB 25 Medan T.P 2020/2021*. Universitas Muhammadiyah Sumatera Utara Medan. Diambil dari.
- Yudiana, N. I. (2015). *Peningkatan Kemampuan Berpikir Kritis Melalui Penerapan Model Pembelajaran Deep Dialog Critical Thinking Dalam Pembelajaran Ekonomi Pada Siswa SMKN 1 Yogyakarta*. Universitas Negeri Yogyakarta. Diambil dari <https://eprints.uny.ac.id/23828/>
- Zaki, A., & Yusri, D. (2020). Penggunaan Media Pembelajaran Untuk Meningkatkan Prestasi Belajar Siswa Pada Pelajaran PKN Di SMA Swasta Dasrusa'adah Kec. Pangkalan Susu. *Jurnal Ilmu Pendidikan*, 7(2), 809–820.