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INFLUENCE OF THE NEARPOD EDUCATIONAL WEBSITE BASED ON THE PROBLEM BASED LEARNING MODEL ON CRITICAL THINKING ABILITY IN CLASS V ELEMENTARY SCHOOL SCIENCE LESSONS

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Abstract

This research aims to test the effect of using the Nearpod educational web based on Problem Based Learning on the critical thinking abilities of class V students at SDN Kembaran. The research method used is quantitative with a one group pretest-posttest research design. The research subjects involved 22 students in class V. The research instruments were an initial test (pretest) and a final test (posttest) which were used to measure critical thinking skills before and after the Nearpod problem-based learning intervention. Data collection was carried out by giving a test in the form of a description of 10 questions which had been tested for validity, reliability, level of difficulty and distinguishing power. Data analysis used descriptive statistical methods and inferential analysis with paired t-test to measure significant differences between pretest and posttest results. The research results showed an increase in the average pretest score of 60.2 while the posttest was 84. Based on the results of the normality test using the Pearson Shapiro Wilk correlation, it can be seen that the Pearson Correlation value obtained a pretest value of 0.527 and a posttest value of 0.548. Both mean they have a strong correlation and mean the data is normally distributed. The results of the correlation test between the pretest and posttest scores show that the probability is 0.000 < 0.50 (5% significance level), so Ho is rejected so it can be concluded that there is a relationship (correlation) between problem-based learning media nearpod and critical thinking skills.

Keywords: *critical thinking; problem-based learning; nearpod educational website; elementary school student.*

Abstrak

Penelitian ini bertujuan untuk menguji efek penggunaan web edukatif Nearpod berbasis Problem Based Learning terhadap kemampuan berpikir kritis peserta didik kelas V di SDN Kembaran. Metode penelitian yang digunakan adalah kuantitatif dengan desain penelitian *one group pretest-posttest design*. Subjek penelitian melibatkan 22 peserta didik di kelas V. Instrumen penelitian berupa tes awal (*pretest*) dan tes akhir (*posttest*) yang digunakan untuk mengukur kemampuan berpikir kritis sebelum dan sesudah intervensi Nearpod *problem-based learning*. Pengumpulan data dilakukan dengan memberikan tes berbentuk uraian sebanyak 10 soal yang telah diuji validitas, reliabilitas, taraf kesukaran dan daya pembeda. Analisis data menggunakan metode statistik deskriptif dan analisis inferensial dengan uji paired t-test untuk mengukur perbedaan signifikan antara hasil *pretest* dan *posttest*. Hasil penelitian terjadi peningkatan skor rata-rata pretest 60,2 sedangkan posttest 84. Berdasarkan hasil uji normalitas menggunakan korelasi Pearson Shapiro wilk dapat diketahui bahwa nilai Pearson Correlation memperolehan nilai pretest sebesar 0,527 dan posttest sebesar 0,548. Keduanya berarti memiliki korelasi yang kuat dan artinya data berdistribusi secara normal. Hasil uji korelasi antara nilai pretest dan posttest dapat diketahui bahwa probabilitas 0,000 < 0,50 (taraf signifikan 5%) maka Ho ditolak sehingga dapat disimpulkan bahwa terdapat hubungan (korelasi) antara media pembelajaran nearpod berbasis *problem-based learning* dengan keterampilan berpikir kritis.

Kata Kunci: berpikir kritis; pembelajaran berbasis masalah; situs web pendidikan nearpod; siswa sekolah dasar.

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Introduction

Primary school education is an important foundation for children's intellectual development. An important skill developed at this level is critical thinking. The ability to think critically is one of the provisions for navigating obstacles and surviving in today's world. (Roudlo, 2020). Critical thinking skills are a crucial element that affects learners' success in the learning process. Although critical thinking skills are important, they are often forgotten or underemphasized in the primary school system. Primary school learners are still developing cognitively, and learners' ability to think critically is still limited compared to older learners. The results of the 2021 PISA assessment by the OECD show that critical thinking skills are still low.

The low level of critical thinking skills in students can be caused by the lack of an approach to learning (Arif et al., 2019). (Arif et al., 2019). In addition, the learning model still runs centered on the teacher rather than the students. This has a major impact on the potential for students' critical thinking. The decline in students' critical thinking skills is caused by the utilization of learning models that are not effective and not on target. (Dari & Ahmad, 2020). Ineffective learning can be caused by the use of inappropriate teaching methods and lack of exposure to real-world problems. (Rahmadani & Puti, 2021).

The problem-based learning model makes learners follow the learning process using learners' thinking skills and real-world contexts to solve problems so that the results will be more meaningful and relevant. Problem-based learning can make learners actively involved in solving problems that are relevant to the lives of learners every day or in their surroundings. (Mulyani, 2019). Problem-based learning is a learning approach that provides authentic experiences to stimulate learners to learn actively, constructively build knowledge, and incorporate the context of learning into real life. In this natural way, learners can develop problem-solving skills to address everyday situations critically by actively participating in the learning process. (Lusmianingtyas & Sriyanto, 2022).

Based on Law Number 20 of 2003 concerning the National Education System from Article 1 Paragraph 1 states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble morals, and the skills needed by themselves, society, nation and state. Article 3 states that national education functions to develop abilities and shape the character and civilization of a dignified nation to educate the life of the nation, aiming to develop the potential of students so that they become human beings who have faith and are devoted to God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens.

Furthermore, Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 22 of 2016 concerning Primary and Secondary Education Process Standards from Article 2 Paragraph 1 emphasizes that the learning process in educational units must be carried out in an interactive, inspiring, fun, challenging manner, motivate students to participate actively, and provide sufficient space for initiative, creativity and independence in accordance with talents, interests and physical development as well as the

psychology of students. Article 4 explains that educators must design and implement learning using a scientific approach, one form of which is the problem-based learning model.

Strengthened by Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 103 of 2014 concerning Learning in Primary and Secondary Education from Article 3 Paragraph 1 states that learning must be designed in such a way as to encourage students to be active in exploring information, think critically, creatively, and be able to solve problems, which is very relevant to the problem-based learning model.

Moreover, Indonesian National Qualifications Framework (KKNI) also explained Levels 1 and 2 in the KKNI which cover basic education emphasize the development of basic skills and generic competencies such as problem solving, decision making and critical thinking, all of which can be developed through the application of the problem-based learning (PBL) model. Based on this juridical basis, it can be concluded that the application of the problem-based learning model in elementary schools is very relevant and important to implement. This is in accordance with national education goals, educational process standards, and learning implementation guidelines which emphasize developing students' potential in critical, creative thinking and problem-solving abilities.

Technology can provide a wide range of information, but if used inappropriately, it can also reduce the time spent on critical thinking. Technology affects the quality of education (Haleem et al., 2022). Digital technology can be brought into children's learning as a learning medium in the classroom. Learning using technology is more effective, so teachers must learn better in learning and use optimal learning resources. (Sagita & Khairunnisa, 2020). According to Sagita & Khairunnisa (2020) also mentioned that the use of technology in learning can be a method to improve the quality of learning outcomes such as the types of media that are often used, one of which is the use of digital or internet technology-based media or methods or e-learning.

Media in the form of digital technology can improve the quality of learning which affects learning outcomes. Critical thinking skills in students can be raised through the use of digital technology. The existence of technology in the form of educational websites has an effect on improving the learning process in the classroom, especially at the student evaluation stage. (Wu et al., 2019).

Nearpod is an educational website that can be a means of delivering learning. The use of near.pod in learning is feasible for students because it can improve writing and thinking skills (Nurmiati et al., 2022). The many features on the near.pod educational website make this digital media effective in learning. Near.pod's interactive videos help learners accept subjects more quickly (Biassari & Kharisma Eka Putri, 2021). The success of learning can be improved through the integration of technology in learning (Demissie et al., 2022).

The low level of critical thinking skills among primary school learners is a serious problem as it affects learners' ability to solve problems, make good decisions and actively participate in the learning process. Changes in approaches, models, media or resources are needed to support the early development of critical thinking skills in learners. This research is also supported by several previous studies such as Critical and Creative Thinking Skills in Elementary School Minimum Competency Assessment: Literacy and Numeracy by Sarah Anida Putri, Nadiya Solastika Andhini, Indah Amalia Putri, Novi Yanthi, Wati Sukmawati explain that changes in students' thinking patterns can be seen in how the learning model is delivered by the teacher and the results can be seen through the test results carried out at the end of the lesson. (Putri, S. A., 2024) Furthermore, The Implementation of Augmented

Reality-Based Learning Media on Civics Subject to Increase Learning Motivation of Elementary School Students by Dinda Firgiyana, Arief Cahyo Utomo talk about how augmented learning media help student to improve their skill. (Firgiyana, D., & Arief Cahyo Utomo., 2024) More details Implementation of Practicum-Based Sets Models to Improve Primary School Students' Understanding of Concepts by Zahirotun Nisa, Din Azwar Uswatun, Astri Sutisnawati, Arsyi Rizqia Amalia explain how to implementation model learning based on characteristic of the student. (Nisa, Z., 2024)

Therefore, this research will integrate through digital technology the nearpod educational website based on problem-based learning to improve the critical thinking skills of grade V elementary school students in the IPAS subject which is the material of natural resources (Indonesiaku Kaya Raya BAB 6 Class 5). This research is expected to reveal empirical evidence about the usefulness of this strategy in bringing out the critical thinking potential of learners, so that it can provide recommendations for future curriculum development and better learning.

(Wen and Walters, 2022) have researched the impact of technology on the writing achievement of students in elementary grades using the meta-analysis method. The results of the study showed that the effect of technology on writing skills in elementary schools increased. The method used is an empirical study (Wen & Walters, 2022). Furthermore, (Iqbal and Campbell, 2023) has researched learning using hand-touch or digital media. The results showed increased learner interest and learning outcomes. Data is taken from the entire population but there needs to be a control variable to compare learning using AR touchless hand interaction with previous learning (traditional). Then, (Zhong et al., 2022) examined the use of project-based learning models, reverse engineering (RE), scientific inquiry (SI), and troubleshooting/debugging (T/D) in the classroom. The results showed a great influence on improving the quality of learning in the classroom.

Furthermore, (Fitria and Eka, 2022) examined the use of problem-based learning models to improve students' critical thinking skills in additive materials with a quantitative pre-experiment method of one-group pretest-posttest design. The result is the N-Gain value for the problem-based learning model with a STEM approach of 0.4 with the acquisition of a pretest score of 45 and a posttest of 67. (Murdiasih & Wulandari, 2022). Then, (Parno et al., 2022) examined the project-based learning model on critical thinking skills using the quasy experiment pretest-posttest control group design. The results showed that the CTS in the experimental class with an average of 65.19 and an increase of 0.52 (medium) was significantly higher than the comparison class with an average of 52.36. (Manurung et al., 2022) conducted research on thinking routine programs affecting critical thinking skills of sixth grade elementary school students in English lessons with a quasi-experimental method. The minimum score showed a clear improvement in the pre-test and post-test. The average score they obtained from the pretest was 52 and in the posttest was 83.8. (Sarıcan & GÜNEŞ, 2021) examined the development of students' critical thinking through foreign language skills in quantitative methods. The results of the study showed that learners can develop a more positive and open-minded view of foreign phrases. (Aryani et al., 2023) have examined the use of nearpod on students' motivation and mathematical communication skills using quantitative methods. The results showed that the final score of students' mathematical communication ability in the experimental class had a mean of 7.69 and a median of 8, while in the control class had a mean of 5.14 and a median of 3.5. The significance value (2-tailed) is 0.047 so that for a one-way test $0.0235 < \propto = 0.05$ so that the rejection of the null hypothesis is obtained.

Researchers examine data from previous research as relevant comparison material to look for existing weaknesses or strengths. Research conducted by Xue Wen and Shauna M. Walter in 2022 entitled *"The Impact of Technology on Students' Writing Performances in Elementary Classrooms: A Meta-Analysis"*, this research only tests the effect of technology on writing skills, it does not test the components that are learning objectives and the basic abilities of students such as critical thinking, creativity, cooperation and so on. (Wen & Walters, 2022) The similarity between this research and subsequent research lies in the use of technology to improve students' abilities. The difference with subsequent research lies in the influence of writing skills, while subsequent research influences students' critical thinking abilities and the use of problem-based learning models of Nearpod. Referring to several studies above, teaching activities can be carried out by integrating digital technology in learning at school. The integration of digital technology in learning can improve the quality of human resources, including students in schools. This is proven by obtaining several results from this research on improving the quality of students' abilities in classroom learning. Future research will integrate digital technology in the form of a Nearpod educational web that can be accessed by students.

The conclusion of the research is that learning models can be integrated with the progress of the times, namely the existence of increasingly sophisticated digital technology. In addition, there are several learning models that are available and function to make learning directed and systematic, one of which is the problem-based learning model. There is a 21st century demand regarding the competence of students to achieve critical thinking skills as one of the categories of improving the quality of learning. As a result, further research will examine how the nearpod educational web based on problem-based learning can affect the critical thinking skills of elementary school students.

Research Methods

This research uses a type of pre-experimental design with a one group pretest-posttest design. One group pretest-posttest research does not have a control class so there are only pretests and posttests for the experimental class. Students will be given a pretest (initial test) before and posttest (final test) after treatment as many as 10 description questions each. This test aims to answer the problem formulation, to find out the results of critical thinking abilities before being given treatment and after being given treatment. A pretest is a test given at the beginning before a treatment is carried out, namely before learning is carried out. Meanwhile, the posttest is a test given when learning has been completed where the treatment has been applied to students. The results of this posttest will be compared with the results of the pretest that was carried out previously. The population of this research is grade V students of SDN Kembaran. Sampling in this study is class VA. The number of VA class students as many as 22 students will be used as objects in the research sample.

The validity test is used to evaluate whether a questionnaire has validity or validity. Reliability acts as a tool to evaluate questionnaires that serve as indicators of certain variables or constructs. According to (Ghozali, 2018: 45), if the Cronbach Alpha coefficient> 0.70, then the questions are considered reliable, and the variable or construct can be categorized as reliable.

This quantitative research applies a statistical approach using the Shapiro-Wilk normality test to evaluate the normal distribution of the collected data. This test aims to ensure that the data used in the study is normal. If the sig value > 0.05, it can be concluded that the distribution in the class is normal (Ridwan, 2019: 165). After verifying the normality

of the data, this study then formulates a statistical hypothesis that can be tested to identify the existence of a significant relationship or difference between the variables studied using the sample t-test.

Results And Discussion

Instruments that have been tested for validity and reliability are then used to collect data. Data was taken from students of class VA SDN as the sample or object of this research. 21 students worked on pretest and posttest questions of 10 questions each. The average pretest score of students on this indicator is 62.5 with a sufficient category while the posttest average is 88 with a very good category. The results of the pretest and posttest will be processed using the help of SPSS software normality test and Pearson correlation using paired simple T-test. Data can be said to be normally distributed if Sig> α with alpha 0.05. The basis for the Pearson correlation test is if the significance value is 0.05, then it is not correlated.

Table 1. Table of Data Normality Test Results

No	Value	Sig.	Alpha	Detail
1	Pretest	0.527	0,05	Data is normally distributed
2	Posttest	0.548	0,05	Data is normally distributed

Source: Output IBM SPSS 27 2023

The results of calculations using normality tests with Pearson correlation and Shapiro-Wilk showed that the Pearson Correlation value for the pretest was 0.527, while for the posttest was 0.548. These values indicate that there is a strong correlation between the pretest and posttest scores. A Pearson correlation close to 1 indicates a positive relationship between two variables, in this context between pretest and posttest scores. That is, the higher the pretest score, the higher the posttest score, and vice versa. With correlation values of 0.527 and 0.548, it can be concluded that the relationship between pretest and posttest is strong, indicating a close relationship between the two variables. In addition, the results of the normality test using Shapiro-Wilk showed that the pretest and posttest data had a normal distribution. Normal distribution indicates that the data has a symmetrical distribution pattern and can be relied upon for further statistical analysis.

Table 2. Sample T-Test Results

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95 Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Pretest-Posttest	-22.38095	7.13601	1.55720	-25.62922	-19.13268	-14.373	20	.000

Source: Output IBM SPSS 27 2023

The correlation test results between pretest and posttest scores show that the probability (Sig. (2- tailed)) obtained is 0.000. This value is clearly smaller than the significance level set at 0.05 (5%). The low value of Sig. (2-tailed) indicates that there is a significant difference between the pretest and posttest scores. With this result, the null

hypothesis (Ho) which states that there is no relationship (correlation) between Nearpod learning media based on problem-based learning and critical thinking skills should be rejected. In other words, there is strong enough statistical evidence to state that there is a relationship or correlation between the use of the learning media and the improvement of students' critical thinking skills. With the rejection of the null hypothesis, it can be concluded that the variables tested in this study are interconnected, and the relationship can be considered statistically significant.

Discussion: The discussion is highlighted through the title and subtitles of the section when needed.

Several previous studies have highlighted that schools improve how students think to become more creative using problem-based learning models and use of tests to see the results of developments in how to think creatively. Research conducted by Baichang Zhong, Xiaofan Liu, Liying Xia, and Wang Sun in 2022 regarding the proposed taxonomy of teaching models in education resulted in project-based learning, reverse engineering (RE), scientific investigation (SI), and troubleshooting/debugging (T/D) as a taxonomy of learning models in STEM. There is a need for further research regarding the 5E learning model (Engage, Explore, Explain, Elaborate and Evaluation) integrating technology with problem-based learning models in accordance with 21st century learning. (Zhong et al., 2022) The research entitled "Problem-based learning model with students' creative thinking abilities" conducted by Dyah Murdiasih and Fitria Eka Wulandari in 2022 is pre-experimental quantitative research with a one-group pretest-posttest design using written test sheets creative thinking descriptors. The N-Gain value for the problem-based learning model with a STEM approach is 0.4, indicating that the problem-based learning model has a moderate influence on students' creative thinking abilities. Thus, it can be concluded that the problem-based learning model is very helpful in improving junior high school students' creative thinking abilities in additive materials. (Murdiasih & Wulandari, 2022)

Article with the title "Impact of The Stem Approach with Formative Assessment in Pjbl on Student's Critical Thinking Skill" in 2022 conducted by Parno, D A Nur'aini1, S Kusairi and M Ali. This research is quantitative research using a quasi-experiment method with a pretest-posttest control group design with subjects of class XI students in Malang, Indonesia. There is an experimental class and a comparison class as control variables. The increase in critical thinking in the experimental class was 0.52, which means there was a positive response in the experimental class compared to the comparison class. (Parno et al., 2022) Based on several previous studies, assessing students' way of thinking through the application of problem-based learning is very helpful, but if you specifically use the Nearpod model in research, the results will significantly show how this method contributes to improving students' critical thinking abilities. Statistical data will show significant differences supported by the pretest and posttest results. Therefore, it can be suggested that the integration of the problem-based learning model using the Nearpod educational website on the critical thinking skills of class V elementary school can be an effective strategy for developing and improving students' critical thinking skills. The practical implications of these findings can help teachers and educators in designing more interactive and in-depth learning to advance the cognitive aspects of students at the elementary school level.

The utilization of learning media technology in primary schools plays a vital role in developing learners' critical thinking skills. By utilizing educational software, interactive simulations and other digital resources, teachers can design learning experiences that encourage learners to think analytically, solve problems and develop critical skills. Technology enables the presentation of information in an engaging and motivating way, triggering learners' curiosity and providing opportunities for them to dig deeper into the subject matter. In addition, technology integration also facilitates collaborative learning and builds teamwork skills, an important aspect in the development of critical thinking. Thus, the use of learning media technology in primary schools not only improves the quality of learning in the classroom, but also nurtures critical thinking skills that are indispensable in facing the challenges of the modern world.

The use of Nearpod influences student achievement with the acquisition of the experimental class pretest score obtained an average value of 38.95, and the experimental class posttest value obtained an average of 83.85. Based on this data, it shows that there is an increase in student learning outcomes after using nearpod learning media. (Simanjuntak et al., 2023). The application of nearpod not only affects the improvement of learning outcomes but can also increase students' interest in learning in elementary schools through the features contained in this application with a variety of more choices and ease of use so that it can meet the needs in the learning process (Afif and Zulherman, 2022).

Conclusion

Based on the results of quantitative research on the effect of the problem-based learning-based Nearpod educational website on the critical thinking skills of grade V. The results can be concluded that the application of Nearpod significantly contributes to the improvement of students' critical thinking skills. Statistical data showed a significant difference between the average pretest score of 60.2 and the average posttest score of 84. The results of the data normality test with Shapiro-wilk can be seen that the Pearson Correlation value of the pretest score is 0.527 and the posttest is 0.548 so it can be considered that the pretest and posttest data are normally distributed and can represent the sample well and can be used for further statistical analysis. The results of the paired sample t-test test with a value of Sig. (2-tailed) is 0.000 <0.5 which means there is a significant difference between the pretest-posttest values. Therefore, it can be suggested that the integration of problem-based learning model with Nearpod in learning in class V can be an effective strategy to develop and improve students' critical thinking skills. The practical implication of this finding can help teachers and educators in designing more interactive and in-depth learning to advance the cognitive aspects of learners at the elementary school level.

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