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# Learning outcomes and critical thinking skills of Islamic Senior High School students in the virus chapter using Nearpod media

*Hasil belajar dan kemampuan berpikir kritis peserta didik Madrasah Aliyah pada pembalajaran materi virus menggunakan media nearpod*

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**Abstract**
The world of 21st-century education requires a generation that can utilize technology and think critically. Nearpod media, which contains indicators of critical thinking skills, is a solution that is expected to increase student engagement and classroom processes. This study investigates the effect of using Nearpod media on students' learning outcomes and critical thinking skills in understanding the discussion of viruses. The quasi-experiment method was used for product cognitive research, while the descriptive approach was used for process cognitive, affective, psychomotor, and critical thinking skills research. The purposive sampling technique was applied to X A and X E students as treatment and control classes. Product cognitive data analysis was conducted using pretest and posttests, which were tested using SPSS 16. The results showed that the use of Nearpod media had a significant effect on product cognitive learning outcomes. In the virus discussion, the cognitive process of using Nearpod media reached the good category, while the affective and psychomotor aspects reached the good and very good categories. Critical thinking results showed an increase in the analysis, interpretation, and evaluation indicators; then, the inference and self-regulation indicators reached the very good category. Explanation reached the good enough category and improved during learning in the experimental class. This study confirms that using Nearpod media can improve students' learning outcomes and critical thinking skills in understanding the discussion of viruses at Islamic Senior High School.

**Keywords:** nearpod media quality; learning outcomes; critical thinking skills; virus

***Abstrak***. *Dunia pendidikan abad 21 membutuhkan generasi yang mampu memanfaatkan teknologi dan berpikir kritis. media Nearpod yang memuat indikator kemampuan berpikir kritis menjadi solusi yang diharapkan dapat meningkatkan keterlibatan siswa dan proses di kelas. Penelitian ini menginvestigasi pengaruh penggunaan media Nearpod terhadap hasil belajar serta kemampuan berpikir kritis peserta didik dalam memahami pembahasan virus. Metode eksperimen semu digunakan untuk penelitian kognitif produk, sementara pendekatan deskriptif digunakan untuk penelitian kognitif proses, afektif, psikomotorik, dan kemampuan berpikir kritis. Teknik purposive sampling diterapkan pada peserta didik X A dan X E sebagai kelas perlakuan dan kontrol. Analisis data kognitif produk dilakukan dengan pretest dan posttest yang diuji dengan SPSS 16. Hasil menunjukkan bahwa penggunaan media Nearpod berpengaruh signifikan terhadap hasil belajar kognitif produk. Pada pembahasan virus, kognitif proses menggunakan media Nearpod mencapai kategori baik, sementara aspek afektif dan psikomotorik mencapai kategori baik dan sangat baik. Hasil kemampuan berpikir kritis menunjukkan peningkatan pada indikator analisis, interpretasi dan evaluasi, lalu indikator inferensi dan pengaturan diri mencapai kategori sangat baik. Eksplanasi mencapai kategori cukup baik dan mengalami peningkatan selama pembelajaran pada kelas eksperimen. Penelitian ini menegaskan bahwa penggunaan media Nearpod dapat meningkatkan hasil belajar dan kemampuan berpikir kritis peserta didik dalam memahami pembahasan virus di Madrasah Aliyah. Kata Kunci: kualitas media nearpod; hasil belajar; kemampuan berpikir kritis; virus.*

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## INTRODUCTION

Technology is significantly relevant in the contemporary era, primarily in supporting various activities in work and education. Educators today can utilize technology to mediate the delivery of knowledge to students. By using this learning media, educators can present interesting material, avoid monotony, and provide attractiveness so that students are stimulated and remain enthusiastic about participating in learning (Salsabila et al., 2023; 2024).

Learning media plays a significant role in the learning process. Its existence is an essential element to help the teacher convey the messages contained in the learning material. Media creates a conducive learning environment, enabling message recipients to learn efficiently and effectively (Asyhar, 2012). According to Sari et al. (2023), media in the form of videos can help teachers present learning in a shorter duration. Learning is more interesting because of the concrete representation than just reading books and listening to material from the teacher. Nearpod media is suitable for use with its interactive features. Nearpod features include interactive quizzes, long questions, memory exercises, answering dots, interactive videos, and answering questions with pictures to increase learning effectiveness (Feri & Zulherman, 2021).

The advantage of Nearpod includes its availability as a website that can be downloaded and accessed through various devices. Other studies also explain that Nearpod is considered easy to use, encourages learner engagement, and provides test features with time limits. These advantages become the basis of research integrating Nearpod as an ICT-based learning tool (Aslami & ZA, 2022).

The Nearpod website also has disadvantages. Some of them are the considerable use of internet data, dependence on a stable internet network, and limited features such as math expressions and drawings that are less user-friendly (Sanmugam et al., 2019). Researchers have taken proactive steps to overcome these limitations, such as choosing locations with stable internet connectivity, providing mobile hotspots, and preparing learning materials via laptops (Aslami & ZA, 2022).

Learning outcomes are changes in students' cognitive, affective, and psychomotor attitudes. These attitudinal changes are obtained after students complete learning through interactions with various learning resources and learning environments (Rusmono, 2014). The quality of learning achievement is influenced by the extent of students' interest and motivation in the reading process (Zainab et al., 2022). Critical thinking skills reflect other skills, such as communication, information management, testing, analyzing, interpreting, and evaluating various evidence (Ramadhan et al., 2016). Learning in class X SMA, learning outcomes, and students critical thinking related to exercises in written tests reflect learning materials; this can be improved with technology. Therefore, efforts are needed from the teacher to objectively and effectively measure learning outcomes and science generic skills of students, especially in learning biology (Safitri et al., 2022). Science education in schools should be integrated with the surrounding situation to align with problems in the field (Putra, 2021). Theoretical learning emphasizes memorization, resulting in students being theoretically proficient but limited in applying it, inhibiting critical thinking skills (Munawarah et al., 2018).

MAN 1 Banjarmasin School has implemented an independent curriculum. However, there is a problem with the teaching method: The biology teacher uses PowerPoint media with a lecture strategy on virus material. This media is considered less effective in supporting critical thinking skills by teachers. The main challenge was transitioning to the new curriculum, especially in making teaching modules.

The MAN 1 biology teacher admitted the difficulty of making teaching modules and the lack of HOTS questions, thus affecting students' critical thinking skills. The independent curriculum, as explained by Fahlevi (2022), emphasizes developing critical thinking skills through in-depth analysis, evaluation, and assessment of information. The study also highlights the vital role of comprehension and memory in improving individual critical thinking skills, with HOTS being an integral part of the education curriculum. By using quality learning tools, teachers are expected to engage learners in learning and support the development of their cognitive potential. Therefore, good learning tools and interactive learning media, such as the Nearpod website, are needed to support learners' activeness.

The research aims to provide an in-depth understanding of Nearpod's effectiveness in improving academic achievement and to evaluate the extent to which Nearpod can facilitate the development of critical thinking skills in the context of learning virus material at MAN 1 Banjarmasin. The practical benefit of this

research lies in the development of education in the institution and contributes more broadly to the general education level. Nearpods are expected to be an alternative learning media in schools.

As a hypothesis, it is expected that using Nearpod will result in significant improvements in critical thinking and learning outcomes and create a participatory learning environment. Referring to this background as a solution step, the researcher chose the research title "Learning Outcomes and Critical Thinking Skills of MAN 1 Banjarmasin Students in Teaching Virus Material Using Nearpod Media."

## RESEARCH METHOD

This research is a quasi-experiment with quantitative and qualitative approaches. It consists of three stages: preparation, implementation, and the end of the research. The research was conducted for six months (August 2023 - January 2024) at MAN 1 Banjarmasin, located at Jalan Kampung Melayu Darat Number 31, Depan Masjid, Banjarmasin City, South Kalimantan.

The school was selected based on the consideration of the implementation of information and communication technology applied at school during the learning process, as well as the presence of LCDs and electronic devices that can be connected to the internet. The sample of this research is MAN 1 Banjarmasin students, the population of which is students of class X A as the treatment class and class X E as the control class. Research with a quasi-experiment design was used to determine the effect of Nearpod media on cognitive products. Descriptive categorization assessed the student's cognitive process, affective, psychomotor, and critical thinking. Data on students' critical thinking is taken from the reference maximum score of critical thinking ability. Each data is expressed with (%) based on the provisions Kunandar (2013) very good (90.1 - 100%), good (70.1 - 90%), good enough (60.1 – 70.00%), less (≤ 60.00%). According to Sugiyono (2019), a quasi-experiment research design with the Table 1.

**Table 1 Quasi-experiment research design**

| Pretest | Treatment | Posttest |
|---|---|---|
| $O_1$ | $X_1$ | $O_3$ |
| $O_2$ | $X_2$ | $O_4$ |

**Description:**
$O_1$ = pretest score before experiment in the experiment class;
$O_2$ = Pretest score before experiment in the control class;
$X_1$ = Experiment using Nearpod website media;
$X_2$ = Not treated using Nearpod website media;
$O_3$ = posttest score after being treated in the experiment class;
$O_4$ = posttest score after being treated in the control class.

The independent variable is the use of Nearpod media. The dependent variables are learning outcomes and critical thinking skills. This research uses various tools and instruments. Devices are components that are needed for learning to take place properly. The tools used are virus material modules. Specifically, research instruments are distinguished based on the formulation of research objectives, namely:

1) Instruments to measure cognitive products in the form of multiple-choice items delivered through pretests and posttests, totaling 15 questions; instruments to measure affective and psychomotor using observer sheets; instruments to measure cognitive processes in the form of LKPD, with a total of 18 questions and three meetings, each meeting six questions.
2) Instruments to measure critical thinking skills come from tasks delivered using Nearpod and paper student worksheets (LKPD).

Data collection and analysis methods in this study are:

1) Product cognitive is obtained through the pretest before learning virus material and the posttest after learning it, where each question is scored with a score of 6.6 if correct and 0 if incorrect. Meanwhile, process cognitive is obtained from the LKPD assessment after the learning process of virus material, where each item is scored according to critical thinking ability if correct and score 0 if wrong. According to the observer sheet provided, affective and psychomotor use a scale of 1-4 in the learning process.

2) Critical thinking skills are taught in Nearpod's LKPD based on a holistic rubric of student answers. Data were described using rubrics and analyzed categorically. This research procedure involved compiling research instruments to analyze the results.

## RESULTS AND DISCUSSION

### 1. Cognitive Product

Learning data has been collected. Evaluation of cognitive learning outcomes was conducted through pretest-posttest learning tests.

**Table 2 Summary of product cognitive learning outcomes**

| | Experiment Class | | Control Class | |
|---|---|---|---|---|
| | **Pretest** | **Posttest** | **Pretest** | **Posttest** |
| **Total** | 1316 | 2779 | 1193 | 1684 |
| **Average** | 39.88 | 84.21 | 37.28 | 52.63 |

**Table 3 Summary of Mann-Whitney hypothesis test for control and treatment classes**

| **Statistical Test[a]** | |
|---|---|
| | **Product Cognitive Learning Outcomes** |
| Mann-Whitney U | 68.500 |
| Wilcoxon W | 596.500 |
| Z | -6.105 |
| Asymp. Sig. (2-tailed) | .000 |

a. Variable Group: Class

Based on the summary of average scores and statistical test results in Tables 2 and 3, using an online learning platform, such as Nearpod, positively impacts product cognitive learning outcomes, measured from the pretest and posttest. The treatment class showed a significant increase in scores compared to the control class. Mann Whitney's statistical test analysis showed an overall significant improvement in product cognition with an Asymp. Sig. (2-tailed) 0.000 (<0.05). The results of this study align with previous findings conducted by Lubis & Ikhsan (2015), showing a significant increase in the achievement of students who use Android learning media.

Research in experimental classes using Nearpod showed an increase in posttest scores compared to pretests. Research by Rahmawati et al. (2023), the index card match learning model using Nearpod media applied in a class. This research showed an increase in the pretest score of 35.05, and the average posttest score reached 73.59. In addition, the N-gain of 0.58 shows an increase in moderate criteria. By referring to this value, it can be concluded that there was an increase in pretest and posttest scores after the application of Nearpod media in the class.

The N Gain results of the treatment class are more significant than the control. The experimental class average N Gain Score is 69.45, categorized as effective enough, while the control class N Gain Score is 24.48, categorized as ineffective. In line with the research of Hidayah et al. (2022), the N-Gain value of the control class (lecture) obtained a percentage of 25.9% in the low category, while the treatment group ( video learning fungi material) obtained a percentage of 42.2% in the medium category.

The improvement reflects the teacher's role in providing effective guidance through Nearpod. Although, at first, the teacher had to adjust to the learning media, by the second meeting, the teacher managed the class well, provided opportunities for student participation, and created a conducive learning environment. The teacher's ability to manage the class is an essential factor in achieving learning objectives, by the view of (Septiyanti, 2023). The role of teachers in the digital era learning system is vital to achieving learning objectives (Wati et al., 2023).

**2. Cognitive Process**

Evaluation of process cognitive learning outcomes is done through the LKPD study test. Based on Table 4, the average learning outcomes of the process at the first (85.03), second (88.48), and third meetings (84.70) of the treatment class were higher than the control class, with an average of 86.07 in the treatment class while the control class was 83.78, this was due to the use of Nearpod learning media. CLDW is a media supporting learning, such as E-Learning, which can potentially improve learning outcomes (Solin et al., 2022). Nearpod media, the independent variable of the experimental class research, affects how students learn. Learning video services in Nearpod facilitate concept understanding, in line with Rezeki & Ishafit (2017), on interactive learning videos that improve understanding. Interactive videos and audio-visual media make learners more understanding and interested in the material.

Interactive videos effectively improve students' understanding of concepts (Saragih et al., 2021). They aim to clarify the delivery of the discussion, overcome time and space limitations, and facilitate understanding (Hidayah et al., 2022). Nearpod facilitates learners' access to teacher materials, increases learner engagement, and enables teacher learning monitoring. Thus, teachers need to choose learning tools that are appropriate to the material.

**Table 4 Summary of average learning outcomes of LKPD**

| No | Value | | | |
|---|---|---|---|---|
| | Experiment | Category | Control | Category |
| 1 | 85,03 | Good | 84,28 | Good |
| 2 | 88,48 | Good | 82,16 | Good |
| 3 | 84,70 | Good | 84,91 | Good |
| **Σ** | **258,21** | **-** | **251,35** | **-** |
| **Average** | **86,07** | **Good** | **83,78** | **Good** |

**3. Affective**

Affective learning outcomes involve character behavior and social behavior. Character behavior assessment includes politeness and responsibility, while social behavior includes the ability to cooperate and develop ideas. Purnama et al. (2020) highlighted feelings, emotions, and acceptance of learning materials in the affective domain.

**Table 5 The mean score of affective aspects of the experimental class**

| | | Average | Category |
|---|---|---|---|
| Affective (Character Behavior) | Courteous | 96,72 | Very good |
| | Responsibility | 96,46 | Very good |
| Affective (Social Behavior) | Collaborate | 96,97 | Very good |
| | Contribute ideas/opinion | 94,70 | Very good |

**Table 6 The mean score of affective aspects of the control class**

| | | Average | Category |
|---|---|---|---|
| Affective (Character Behavior) | Courteous | 96,35 | Very good |
| | Responsibility | 96,09 | Very good |
| Affective (Social Behavior) | Collaborate | 95,57 | Very good |
| | Contribute ideas/opinion | 89,84 | Good |

Based on Tables 5 and 6, the character behavior of students in the control and experiment classes showed good to very good categories in contribute ideas/opinion. Learners are polite, respectful of friends, and show responsibility in doing tasks. The research results by Putra et al. (2021) showed a positive correlation between science process skills and learning outcomes, including attitudinal aspects. Marliyah (2022) found that implementing a learner-centered learning model with Nearpod increased students'

attendance, participation, and classroom activities, which could encourage opportunities to participate in learning.

Learners' social behavior in cooperation and developing ideas showed good to very good categories. Nearpod contributes positively by making it easier for learners to interact and contribute opinions through the answer column feature. The research by Hakami (2020) and Musa & Momani (2022) shows the role of Nearpod in improving learners' interaction and activeness. Observation of learning outcomes shows the effectiveness of learners in expressing opinions with an average percentage value of 82.06%, in line with research by Septiyanti (2023), which notes that Nearpod can maintain learners' attention and encourage active participation throughout the learning process.

**4. Psychomotor**

Psychomotor learning outcomes include evaluating several aspects, namely finding sources of information, implementing learning steps, and collecting LKPD (Learner Worksheets). According to Purnama et al. (2020), psychomotor process skills involve physical movements of the limbs in doing work. Based on Tables 7 and 8, the treatment class has higher psychomotor scores than the control class. Obstacles in the study included students without cell phones, which affected the learning process, but these obstacles can be overcome by lending cell phones to each other. Waiting time for students with network constraints also affected learning, and assignments had to be taken home. The afternoon-to-evening class was disrupted as learners' attention was divided, but learning continued as planned. The use of Nearpod increased the enthusiasm of learners in class X, as seen from the high morale and regularity of assignment submission.

Barriers to learning include school activities that are detrimental to class time, classes with the last class hour, lack of discipline and learner activity, and frequent in and out of class. Supporting factors involve complete facilities, parental support, good teacher coordination, and school support. Efforts to overcome obstacles involve motivation to learn by scheduling time, optimal teaching in the last hour, variation of KBM methods, and coordination with parents and school parties.

**Table 7 The mean score of psychomotor aspects of the experimental class**

| Psychomotor Aspect | Average | Category |
|---|---|---|
| Seeking Information Sources | 95,96 | Very good |
| Performing Activities Based on Learning Steps | 95,96 | Very good |
| Collecting LKPD | 96,72 | Very good |

**Table 8 The mean score of psychomotor aspects of the control class**

| Psychomotor Aspect | Average | Category |
|---|---|---|
| Seeking Information Sources | 92,97 | Very good |
| Performing Activities Based on Learning Steps | 94,79 | Very good |
| Collecting LKPD | 95,83 | Very good |

**5. Critical Thinking Ability**

Based on Tables 9 and 10, aspects of critical thinking skills in both classes showed improvement during the learning process, with good to very good categories in evaluation, inference, interpretation, analysis, self-regulation, and good enough explanation. The research used Nearpod Electronic Learner Worksheets with indicators that were different from those of previous research. The average results of critical thinking skills using Nearpod Electronic LKPD showed an increase, which aligns with Amalia (2018). The CORE learning model, as described by Ayudia & Mariani (2022), encourages the active involvement of learners in analyzing and solving problems, supported by customized LKPD. Group work also facilitates the exchange of understanding, which aligns with Putri et al. (2020).

**Table 9 Summary of the mean critical thinking ability of learners per category of experimental classes**

| Aspects Observed | LKPD (%) | | | Average (%) | Category |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | | |
| Interpretation | 100 | 88,09 | 74,02 | 87,37 | Good |
| Analysis | 100 | 87,88 | 100 | 95,96 | Very good |
| Evaluation | 78,18 | 97,88 | 75 | 83,68 | Good |
| Inference | 86,36 | 89,90 | 90,40 | 88,88 | Good |
| Explanation | 69,70 | 75 | 80,30 | 75 | Good |
| Self-regulation | 96,97 | 93,43 | 96,46 | 95,62 | Very good |

**Table 10 Summary of mean critical thinking ability of learners per control class category**

| Aspects Observed | LKPD (%) | | | Average (%) | Category |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | | |
| Interpretation | 100 | 74,84 | 82,36 | 85,73 | Good |
| Analysis | 100 | 90,63 | 70,31 | 86,98 | Good |
| Evaluation | 71,56 | 84,38 | 81,25 | 79,06 | Good |
| Inference | 81,98 | 86,98 | 100 | 89,65 | Good |
| Explanation | 70,16 | 65,63 | 69,53 | 68,44 | Good Enough |
| Self-regulation | 100 | 96,35 | 100 | 98,78 | Very good |

According to Gustini et al. (2023) and Risky et al. (2023), the use of Nearpod media in learning has a positive impact on improving critical thinking skills. Although there was a decrease in the interpretation and analysis indicators in the treatment class, overall, students' critical thinking increased and was categorized as good or very good. This result differs from Mispa et al. (2021), which reported very good categories for all indicators.

Using conventional methods, the control class improved critical thinking skills differently than the class using Nearpod. Control class students cannot apply critical thinking because learning focuses more on observation without technology literacy and engineering design. Ananda & Salamah (2021) shows that using conventional media in the control class can reduce critical thinking skills. Annida et al. (2022) added that several factors inhibiting critical thinking skills include a lack of internal motivation and a lack of facilities and infrastructure that can support teacher performance and student activities.

## CONCLUSION

The research shows that the application of Nearpod positively impacts student learning outcomes, especially on virus material. The treatment class achieved a higher N Gain increase in the cognitive learning outcome aspect of the product, with statistical significance of the effect through the Mann-Whitney test. In addition, students in both classes' affective and psychomotor learning outcomes were in the good to very good category. The level of critical thinking skills of the treatment class students was also proven to be higher, including interpretation, analysis, evaluation, conclusion, explanation, and self-regulation. It is concluded that using Nearpod positively improves learning outcomes and students' critical thinking skills in class X MAN 1 Banjarmasin on virus material. Recommendations for future researchers are expected to try to apply Nearpod in other fields of biology, data collection that requires several meetings so that further research must plan time allocation properly and more so that learning hours can be appropriately utilized, as well as students who are not accustomed to using Nearpod media so that teachers must be able to manage students and learn to use Nearpod media properly.

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