

The effectiveness of nearpod assisted digital daily assessment to improve the creative thinking abilities and metacognitive skills of science students

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Article Information	Abstract
Keyword: Digital assessment; Nearpod; Creative thinking; Metacognitive skills; Learning media Kata Kunci: Asesmen digital; Nearpod; Berpikir kreatif; Keterampilan metakognitif; Media pembelajaran History: Received : 19/07/2023 Accepted : 01/10/2023	This study delves into the pressing requirement for employing Nearpod-supported daily digital assessments to boost students' creative thinking abilities and metacognitive skills. This research aims to evaluate the effectiveness of using the Daily Assessment digital learning media assisted by Nearpod in improving junior high school biology science students' creative thinking abilities and metacognitive skills. This is a quasi-experimental research. The research participants consisted of two classes of science students at junior high school who were chosen randomly. The experimental class consisted of 27 students, while the control group consisted of 24 students. Data collection tools include validated tests of creative thinking abilities and metacognitive skills. Data were analyzed using descriptive and inferential statistical techniques using the ANCOVA test. The research results show that using the Daily Assessment digital learning media assisted by Nearpod significantly improves students' creative thinking abilities and metacognitive skills compared to conventional learning methods. Students demonstrate an increased capacity to generate new ideas, make connections between subtopics, and solve problems creatively. This research proves that the Daily Assessment digital learning media assisted by Nearpod effectively improves students' creative thinking abilities and metacognitive skills. Abstrak Studi ini menggali kebutuhan mendesak untuk menerapkan penilaian digital harian yang didukung Nearpod untuk meningkatkan kemampuan berpikir kreatif dan keterampilan metakognitif siswa. Penelitian ini bertujuan untuk mengevaluasi efektivitas penggunaan media pembelajaran digital Daily Assessment berbantuan Nearpod dalam meningkatkan kemampuan berpikir kreatif dan keterampilan metakognitif siswa sains biologi Sekolah Menengah Pertama (SMP). Ini adalah penelitian kuasi eksperimen. Partisipan penelitian terdiri dari dua kelas siswa sains di SMP yang dipilih secara acak. Kelas eksperimen terdiri dari 27 siswa, sementara kelompok kontrol terdiri dari 24 siswa. Alat pengumpulan data meliputi tes kemampuan berpikir kreatif dan keterampilan metakognitif yang telah divalidasi. Data dianalisis menggunakan teknik statistik deskriptif dan inferensial dengan menggunakan uji ancova. Hasil penelitian menunjukkan penggunaan media pembelajaran digital Daily Assessment berbantuan Nearpod secara signifikan meningkatkan kemampuan berpikir kreatif dan keterampilan metakognitif siswa dibandingkan metode pembelajaran konvensional. Siswa menunjukkan peningkatan dalam kapasitas mereka untuk menghasilkan ide-ide baru, menjalin hubungan antar subtopik, dan memecahkan masalah secara kreatif. Penelitian ini membuktikan media pembelajaran digital Daily Assessment berbantuan Nearpod efektif meningkatkan kemampuan berpikir kreatif dan keterampilan metakognitif siswa.

A. Introduction

Education in the digital era has changed the learning paradigm at various levels of education, including the Junior High School (SMP) level. Digital learning media is increasingly being introduced in an effort to increase the effectiveness and interactivity of the learning process. One of the digital learning media that attracts attention is Daily Assessment. Media Daily Assessment is a process of daily assessment of various types of media, such as newspapers, magazines, television, radio, and other digital platforms (Pangestuti & Prasmala, 2018). The purpose of Media Daily Assessment is to gather information, analyze media content, and gain a better understanding of current issues being discussed in the media (Amnie et al., 2021).

In the Media Daily Assessment in learning, an individual or team of students will routinely observe and analyze various media sources relevant to a particular learning topic (Schmidt & DeSchryver, 2022). They will record and evaluate various aspects including news and other information presented in the media according to the material being studied. In addition, they will also identify trends, themes or issues that are being discussed in the media. The daily assessment in the media class will necessitate students to seek out contemporary and popular sources that pertain to the subject matter (Adelia et al., 2021).

The implementation of daily media assessments can be facilitated with the assistance of various platforms, and one such supportive tool is Nearpod. Nearpod is a digital educational platform designed to enhance student engagement and participation within the classroom. Through Nearpod, educators can generate interactive presentations, quizzes, surveys, and other activities that students can readily access and engage with on their own devices, whether it be laptops, tablets, or smartphones (Wisano Powa & Murniarti, 2022). This platform is adaptable for both traditional classroom settings and remote learning environments. Its primary objective is to foster a more dynamic, captivating, and intriguing learning atmosphere for students, enabling them to actively participate in the learning process and gain a deeper grasp of the subject matter (Feri & Zulherman, 2021). The integration of daily assessment media supported by the Nearpod platform is anticipated to help students enhance their critical thinking abilities.

Two critical elements in the realm of science education that demand reinforcement during the learning process are creative thinking capabilities and metacognitive skills. Creative thinking entails

the capacity to generate fresh ideas and devise innovative problem-solving approaches (Utami et al., 2018). This aptitude encompasses the skill to examine issues from diverse angles and craft inventive solutions. By cultivating this capacity within students, they are more apt to think unconventionally and devise novel methods for surmounting challenges (Astuti et al., 2020). Innovation plays a pivotal role in the genesis of fresh ideas, technologies, and inventions, thereby fostering beneficial advancements in various domains (Dupri et al., 2021).

Meanwhile, metacognitive skills pertain to self-awareness of cognitive processes, the regulation of learning, progress monitoring, and the management of learning strategies. Metacognitive skills, often referred to as "thinking about thinking," denote an individual's ability to recognize, control, and oversee their comprehension of how they learn (Pozas et al., 2020). Effective learning hinges on the utilization of metacognitive skills, underscoring the significance of imparting these skills to students throughout the learning journey (Gutiérrez De Blume & Londoño, 2021). Armed with metacognitive skills, students can discern their strengths and weaknesses in the learning process. They can pinpoint areas of proficiency and domains where they need to enhance their comprehension, enabling them to channel their efforts effectively and cultivate confidence in their learning abilities (Garzón et al., 2020).

However, the reality is that students often encounter challenges when it comes to nurturing their creative thinking aptitudes and metacognitive competencies (Firdaus et al., 2022; Wilis et al., 2023). Traditional teaching approaches, which frequently rely on lectures and passive learning, often fall short in stimulating students to think creatively and hone their metacognitive skills (Adnan & Bahri, 2018; Parlan et al., 2018). In this context, the implementation of Nearpod-supported Daily Assessment digital learning resources holds the promise of enhancing the creative thinking capacities and metacognitive proficiencies of middle school science students (Setiawan & Nurhidayah, 2021; Reimers et al., 2020). Nearpod, as a digital learning platform, empowers educators to construct interactive educational materials that actively involve students through the incorporation of queries, surveys, collaborative tasks, and other functionalities.

Despite the extensive utilization of digital learning resources in contemporary education (de Groot et al., 2023; Mansur & Utama, 2021; Sefriani

et al., 2021), there remains a necessity for additional investigation to assess its efficacy in enhancing the creative thinking competence and metacognitive proficiencies of middle school science students. Consequently, the present study endeavors to bridge this research gap through the implementation of a quasi-experimental research design aimed at appraising the effectiveness of employing digital learning media, specifically Daily Assessment with Nearpod support, in the enhancement of creative thinking abilities and metacognitive skills among junior high school science students.

B. Material and Method

Research Design: This study used a quasi-experimental research design with a control group and an experimental group. This design allows comparison between the group using Nearpod-assisted Daily Assessment digital learning media (experimental group) and the group using conventional learning methods (control group). The research design is presented in table 1.

Table 1 Pretest and post-test control group

Class	Pre-test	Independent variable	Post-test
Media Digital	O1	X	O2
Conventional	O1	0	O2

Information:

O1 = Pre-test

O2 = Post-test

X = Experimental Class applied by Media Digital

0 = Control Class applied by Conventional Media

The subjects in the study consisted of two randomly selected classes of junior high school science students. Each class consisted of 27 and 24 students, so the total number of participants was 51 students.

Data Collection Instruments: a. Creative Thinking Ability Test: This test is designed to measure students' ability in creative thinking. The test will include questions that test students' ability to generate new ideas, make connections between sub-knowledge, and solve problems innovatively. b. Metacognitive Skills Test: This test is designed to

measure students' skills in metacognition, including self-understanding of the thinking process, regulation of learning, monitoring progress, and regulation of learning strategies. Procedure of this research includes:

- Pre-test: Before the treatment is conducted, both groups (experimental and control) will be given a test of creative thinking ability and metacognitive skills as a baseline.
- Treatment: The experimental group will receive learning in the form of implementing Nearpod-assisted Daily Assessment digital learning media in science learning sessions twice a week over a four-week period. The control group will receive the pre-existing conventional learning method.
- Post-test: After the treatment period is over, both groups will be given the same creative thinking ability and metacognitive skills tests as in the pre-test as the final measurement. The collected data will be analyzed using descriptive and inferential statistical analysis techniques. To compare the test results between the experimental and control groups, the ancova test will be used.

C. Results and Discussion

This study aims to evaluate the effectiveness of using digital learning media Daily Assessment assisted by Nearpod in improving creative thinking ability and metacognitive skills of junior high school science students. In this study, students' creative thinking ability and metacognitive skills were measured before and after the learning treatment using digital learning media.

Improving Creative Thinking Ability

The results of data analysis showed a significant difference between the experimental group (who used digital learning media Daily Assessment assisted by Nearpod) and the control group (who used conventional learning methods) in improving the creative thinking ability and metacognitive skills of junior high school science students. The increase in scores between experimental and control classes in relation to creative thinking ability can be seen in Table 2 and the results of hypothesis testing using ancova in Table 3.

Table 2 Comparison of the average scores of Experimental and Control classes based on Creative Thinking Ability

Class	Creative Thinking Ability			
	Mean		Std. Deviation	
	Pre	Post	Pre	Post
Experiment	40,645	82,673	6,471	4,957
Control	42,769	45,208	6,122	6,951

Based on Table 2, it can be seen that the increase in pretest to post test scores in the experimental class is 10.3% and the increase in pretest to post test scores in the control class is

5.7%. This proves that the increase in the value of creative thinking skills of junior high school students is better in the experimental class compared to the control class.

Table 3 Ancova test results of the effect of Digital Daily Assessment on students' creative thinking skills

Tests of Between-Subjects Effects					
Dependent Variable: YCreative					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	17541.126 ^a	2	8770.563	242.221	0.000
Intercept	3770.909	1	3770.909	104.143	0.000
XCreative	24.111	1	24.111	0.666	0.419
Class	16799.502	1	16799.502	463.960	0.000
Error	1701.819	47	36.209		
Total	22842.750	50			
Corrected Total	19242.945	49			

a. R Squared =0 .912 (Adjusted R Squared =0 .908)

The analysis results in Table 3 show that the experimental group using Nearpod-assisted Daily Assessment digital learning media had a significant increase in creative thinking ability compared to the control group ($0.000 < 0.05$). Students who used Nearpod showed an increase in creative thinking ability. Nearpod's capacity to enhance students' creative thinking skills is attributed to its capability to enable educators to incorporate a wide array of interactive elements within their presentations. These elements encompass multiple-choice queries, images, videos, surveys, and open-ended inquiries. Consequently, students are actively engaged in the learning process, fostering cognitive stimulation and inspiring innovative thinking (Hakami, 2020; Reimers et al., 2020; Sanmugam et al., 2019).

The use of Nearpod-assisted Daily Assessment digital learning media significantly improved the creative thinking ability of junior high school science students. Research shows that students involved in the use of Nearpod have a better ability to generate new ideas (Kovalskys, n.d.; Qi et al., 2022), make unusual connections (Peng, 2022; Wahyudi et al., 2022) and solve problems innovatively (Peng, 2022; Sanmugam et al., 2019; Mastura, 2022). The use of interactive digital learning media has an important role in stimulating and developing students' creative thinking abilities.

The results of this study are in line with research conducted by (Angraini & Firdaus, 2022; Elmawati & Juandi, 2022; Hasanah et al., 2019; Rahmawati & Kamaludin, 2019) regarding the development of instructional media and their impact on students' creative thinking abilities. Here are some reasons why the use of interactive digital learning media is important in the context of creative thinking. Interactive digital learning

media, such as Nearpod, can bring interactive elements that attract students' attention. With features such as questions, polls, collaborative tasks and online discussions, students are actively involved in the learning process (Chase et al., 2017). This active engagement stimulates students' creative minds and motivates them to think deeply and generate new ideas. In addition, the use of this media is able to facilitate students' collaboration and communication (Jumhur et al., 2021). Interactive digital learning media allows students to collaborate and communicate online with fellow students or teachers. This creates a collaborative learning environment where students can share ideas, discuss and give each other feedback (Hidayat & Firmantika, 2020). Through this collaboration and communication, students can be inspired by others' thoughts and perspectives, which can stimulate their creative thinking ability (Hadiyah et al., 2022; Herlina et al., 2018).

Using Digital Media will also be able to provide interesting visual and audio stimulation especially with the help of Nearpod. Digital learning media can present information through interesting visual and audio elements (Dori et al., 2018). The graphics, animation, video and sound used in this media can enrich students' learning experience and trigger imagination and creative association. Fun and engaging visual and audio stimulation makes the learning process more interesting and makes it easier for students to think creatively (Agustiana et al., 2021). This digital learning media allows easy and quick access to a variety of resources and relevant content. Thus, students can explore information in depth and breadth, and gain a variety of different perspectives (Saputri & Corebima, 2020). Easy access to diverse resources and content provides opportunities for students to develop their creativity in solving problems and

coming up with innovative solutions (Amnie et al., 2021).

Teachers can easily provide feedback and monitor learners' learning progress. Interactive digital learning media are often equipped with immediate feedback and progress monitoring features (Ho et al., 2023). These attributes facilitate students in gaining a deeper insight into their capabilities, recognizing their strengths and weaknesses, and devising necessary strategies for enhancing their creative thinking skills (Agustiana et al., 2021). The swift feedback loop and continuous progress monitoring create opportunities for students to cultivate and refine their creative thinking abilities over time (Astuti et al., 2020).

Creative thinking abilities in this study involve flexibility and the ability to adapt to change (Kariimah et al., 2022). In the contemporary, ever-evolving, and intricate world, the aptitude for creative thinking and swift adaptation is of paramount importance (Suardipa, 2019). Students who possess these skills are better equipped to navigate change, acclimatize to new circumstances, and seek innovative approaches to attaining their objectives (Naza et al., 2020). Furthermore,

creative thinking proficiencies can contribute to the enhancement of students' communication capabilities (Herlina et al., 2018). As they construct inventive solutions, students learn to effectively convey their concepts to others. This encompasses the ability to articulate intricate notions, exert influence on peers, and collaborate within teams. Proficient communication is indispensable in various facets of life, including professional endeavors and interpersonal relationships (Schulz & FitzPatrick, 2016).

Improvement of Metacognitive Skills

Ancova results also revealed that the experimental group using Nearpod-assisted Daily Assessment digital learning media showed a significant improvement in metacognitive skills compared to the control group ($0.00 < 0.05$). Students using Nearpod showed improvement in self-understanding of the thinking process, study organization, progress monitoring, and regulation of learning strategies. The increase in scores between the experimental and control classes in relation to Metacognitive Skills can be seen in Table 4 and the results of hypothesis testing using ancova can be seen in Table 5.

Table 4 Comparison of the average scores of Experimental and Control classes based on Students' Metacognitive Skills

Class	Metacognitive Skills			
	Mean		Std. Deviation	
	Pre	Post	Pre	Post
Experiment	50,673	86,269	6,654	5,795
Control	40,000	49,479	7,518	7,939

Based on Table 4, it can be seen that the increase in pretest to post test scores in the experimental class is 70.2% and the increase in pretest to post test scores in the control class is

23.69%. This proves that the increase in the value of metacognitive skills of junior high school students is better in the experimental class compared to the control class.

Table 5 Ancova Test Results of the effect of Digital Daily Assessment on students' Metacognitive Skills

Tests of Between-Subjects Effects					
Dependent Variable: YMeta					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	17151.268 ^a	2	8575.634	198.561	0.000
Intercept	3212.703	1	3212.703	74.387	0.000
XMeta	259.478	1	259.478	6.008	0.018
Class	8692.787	1	8692.787	201.274	0.000
Error	2029.877	47	43.189		
Total	254547.750	50			
Corrected Total	19181.145	49			

a. R Squared = 0.894 (Adjusted R Squared = 0.890)

Thus, the results of this study provide evidence that the use of digital learning media Daily Assessment assisted by Nearpod is effective in

improving creative thinking ability and metacognitive skills of junior high school science students. The use of this media provides

opportunities for students to be actively involved in learning, encourages creative thinking, and develops self-understanding of the learning process.

The use of Nearpod-assisted Daily Assessment digital learning media also significantly improved junior high school science students' metacognitive skills. Students who used Nearpod showed improvement in self-understanding of thinking processes, learning organization, progress monitoring, and regulation of learning strategies (Abdullah et al., 2022; Ahmed et al., 2022; Irianto et al., 2021; Le, 2023; Mckay & Ravenna, 2016; Qiao, 2022).

The results of this study are in line with research conducted by (Hendi et al., 2020; Indra et al., 2018) regarding the development of instructional media and their impact on students' metacognitive skills. Regarding the understanding of students' thinking process, digital learning media can provide students with a deeper understanding of the thinking process (Zulkiply, 2009). Through the presentation of interactive content, students can observe and track the cognitive processes involved in problem-solving or grasping specific concepts (Branigan, 2019). The utilization of graphics, animations, and visual representations in such media aids students in visualizing and comprehending the steps or strategies essential for effective thinking (Firmansyah et al., 2022).

The adoption of this media also supports students in structuring their learning experience. Digital learning resources additionally assist students in effectively managing their learning journey. Features like scheduling, task assignment, and reminders empower students to better allocate their time, establish priorities, and optimize their study schedules (Branigan, 2019). Moreover, it can offer students lucid guidance and direction concerning their learning process, fostering a well-organized and structured learning environment (Al-Gaseem et al., 2020).

Digital learning resources often incorporate features for monitoring progress, enabling students to track their advancement in the thought process (Dori et al., 2018). Through this monitoring, students can gain feedback on their strengths and weaknesses, know the areas where they need to improve, and measure their achievement against learning objectives. This progress monitoring empowers students to identify domains requiring more effort and make the requisite enhancements to their thought processes (Ho et al., 2023).

Digital learning media can promptly provide feedback to students, whether in the form of automated responses, assessments, or

recommendations. This feedback supports students in refining their comprehension, assessing the efficacy of their thought strategies, and guiding them toward more effective approaches (Suganthi et al., 2020). The rapid and targeted feedback furnished by digital learning media promotes continual reflection and enhancement in students' thought processes.

Furthermore, digital learning media afford effortless and swift access to a diverse array of supplementary resources, including videos, articles, journals, and interactive simulations (Avargil et al., 2018). These resources enable students to deepen their understanding of the subject at hand, unearth additional information, and witness practical applications of concepts in real-world contexts. The convenient and expansive availability of these supporting resources facilitates the expansion of students' knowledge and perspectives within their thought processes (Gutiérrez De Blume & Londoño, 2021).

Based on the outcomes of this investigation, several factors contribute to the effectiveness of Nearpod-supported Daily Assessment digital learning materials in enhancing the creative thinking aptitude and metacognitive skills of middle school science students. These factors encompass Nearpod's interactive features, such as the incorporation of questions, polls, and collaborative tasks, which have the potential to stimulate active student engagement in the learning process (Ambarwati et al., 2019). Furthermore, the capability to furnish immediate feedback and oversee student progress plays a pivotal role in augmenting the efficacy of this educational tool.

The findings of this study have important implications for learning practices in junior high schools. The utilization of digital learning materials, specifically Daily Assessment with Nearpod support, can serve as a potent strategy for enhancing the creative thinking skills and metacognitive abilities of middle school science students. Educators can leverage this tool to craft dynamic learning experiences, bolster student involvement, and facilitate a deeper comprehension of, as well as effective management of, cognitive processes. Nonetheless, it's important to acknowledge the limitations of this study. Further research is warranted to assess the effectiveness of Nearpod-assisted Daily Assessment digital learning materials in broader contexts and among diverse student populations. Additionally, it is imperative to consider other variables that may influence the efficacy of this educational medium.

D. Conclusion

Based on the research findings, it can be concluded the integration of Nearpod-assisted Daily Assessment digital learning media has proven to be highly effective in enhancing both the creative thinking abilities and metacognitive skills of junior high school science students. Through the utilization of Nearpod, students have demonstrated improvements in generating innovative ideas, establishing connections between subchapters, and creatively solving problems. Nearpod's interactive features actively engage students in the learning process, stimulating their creativity. Moreover, the use of Nearpod has also led to advancements in students' metacognitive skills, including self-understanding of thinking processes, organization of learning, progress monitoring, and regulation of learning strategies. Immediate feedback and progress tracking provided by Nearpod have been instrumental in helping students better comprehend and manage their thought processes. This interactive digital learning medium offers several advantages, including collaboration opportunities, engaging multimedia elements, access to supplementary resources, and constructive feedback, all contributing significantly to strengthening students' creative thinking and metacognitive capabilities.

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