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Nearpod Integration: What and How Is the Potential for Teaching and Learning?

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Abstract: - The demands of education in the era of the industrial revolution 5.0 are getting higher, one of which is the integration of the use of technology in learning activities. Technology has various benefits in learning, for example to help teachers create an online-based learning system through a learning management system. Learning management system allows students to learn more actively and independently. Nearpod is a learning management system that can be used for teaching. Nearpod has various advantages compared to other learning management system, for example, it is interactive. Some of Nearpod's unique features for example: easy access to Nearpod, the availability of various quiz features, and other interesting features make Nearpod a platform for online and blended learning. The purpose of this study is to see the potential of Nearpod integration in learning. Using the scoping review method, 15 selected articles were analyzed to answer research questions. The results of the study show that Nearpod integration has a positive impact on the teaching and learning process, such as: increasing interactive learning, positive student attitudes, and learning outcomes. Furthermore, teachers find it helpful when teaching using Nearpod. Lastly, Nearpod integration can potentially improve teaching efficiency. However, the use of Nearpod tends to be implemented only in science learning, even still rarely in mathematics learning. Based on Nearpod's advantages and findings in empirical studies, Nearpod can be further explored for learning in areas including mathematics. Future work suggested is the development of Nearpod to improve the quality of learning, especially mathematics learning.

Keywords: Nearpod, Distance learning, Scoping review, Mathematics education

I. INTRODUCTION

Lately, online learning and blended learning have been popularized following post-pandemic conditions that are still changing. Online and hybrid learning, distance learning, both require the role of digital technology. Furthermore, the integration of digital technology in education does not only act to carry out learning but can also affect student learning outcomes. The integration of digital technology in the world of education continues to show a positive impact, for the last 10 years the use of digital technology has been able to increase students' abilities and motivation [1] for example is to improve problem solving skills and spatial skills of students [2]. One of the digital technologies that is very important for carrying out online and offline learning is learning management system (LMS). Apart from being a synchronous learning system, several LMS can be used as an asynchronous. Nearpod is a LMS that can be used both synchronously and asynchronously as well as being interactive. The space provided by Nearpod for storing learning videos, e-books, and collaborative boards facilitates students to re-access learning materials whenever needed. Nearpod's time flexibility provides an advantage for students to access again and repeat material that is considered difficult and skip material that is considered easy. Alan Schoenfeld, originator of the theory of teaching for robust understanding, states that the activity of facilitating students according to their position of ability in an equitable manner is one of the ideals of powerful learning [3].

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Nearpod is an LMS that teachers can use to present learning to students both synchronously and asynchronously. Some of the advantages of Nearpod are that it is free for small classes, easy to access, and uses digital technology assistance [4] . Nearpod provides various quiz features such as multiple choice, matching, true-false, short entries, and descriptions. One of the most interesting features of Nearpod is the presence of a collaborative board which functions as a discussion space. In presenting learning material, the teacher can insert questions in the video that

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is being played at the same time it can be set so that students cannot skip it so students must watch the video until it is finished. Nearpod can be an option in presenting teaching and learning activities both as the main media and supporting media. Aside from being a learning material storage medium, Nearpod can act as a real time interactive media between teachers and students and students and students [4]. Furthermore, according to [5] and [6] nearpod has the potential to improve active learning.

Based on data, several researchers have found that the integration of Nearpod in learning has a positive impact on teaching and learning activities. This study aims to analyze the results of research regarding the integration of Nearpod in learning, so that it can be seen to what extent the potential for using Nearpod is when implementing it in learning. Furthermore, several studies have shown that the integration of Nearpod in learning corresponds to various subjects including science and mathematics. Thus, this study wants to explore further about the implementation of Nearpod in learning, especially mathematics learning.

II. RESEARCH METHOD

This research is a literature study with a scoping review type. According to Arksey and O'Malley's, there are five stages that are passed in the scoping review, namely: “identifying research questions, identifying relevant studies, study selection, charting the data, summarizing and reporting the results” [7]. The data source comes from Google Scholar using the keyword "Nearpod", the selection of keywords without restrictions on certain aspects aims to obtain broader results. Through these keywords, about 5 thousand articles were obtained, which then 15 articles were selected based on several criteria, namely period, study focus, research method, sample, and language used. The article was chosen if it was within the last 10 years, focusing on the field of education. The criteria for the research method chosen are the results of research using the Quati-experiment, qualitative, and mixed method. To be focused on education, the research sample must be students, prospective teacher students, or teachers. Of the various articles that use the national language, the only articles selected are articles with the official international language, namely English.

Table 1 Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Time period	The last 10 years (2014-2023)	Studies outside 2014-2023 period
Study focus	Education	Fields other than education
Research method	Quati-experiment, qualitative, and mixed method	Other methods
Sample	Student and/or teacher	General public who has completed education and do not work as a teacher
Language	English	Other languages

III. RESULT AND DISCUSSION

Based on the data obtained, the researcher summarizes and present it in table 2, 3, and 4. Based on the three tables, it appears that Nearpod integration in learning can be an option for conducting interactive learning. As with Hakami's research on 74 female students, he found through a mix-method that Nearpod could promote active learning, and based on the questionnaires distributed, it was found that students were satisfied with the use of Nearpod [5]. Similar results were found by [8], 120 students in the United Arab Emirates expressed a positive

response to using Nearpod to enhance interactive learning.

Interactive learning occurs when students are actively involved both with the teacher and with other students. [9] found that 48 students from 2 faculties who did online learning felt helped and were actively involved in Nearpod-based learning. Nearpod can be a new tool in welcoming learning in a new era [9]. A total of 136 first year students and 109 second year students were taught using Nearpod, [6] found that the use of Nearpod can have a positive impact in student learning environments. This result is supported by [10], as many as 63 students in different countries were given questionnaires, students felt that Nearpod integration could provide a place to respond in learning. Similar results were found by [11] at the secondary school level, 30 grade 11 high school students demonstrated good classroom interaction when taught using Nearpod. In different countries, [12] found that 88 middle school students suggested using Nearpod to support active learning. Not only students, based on tests, surveys, and interviews, [12] get the result that the teacher prefers to use Nearpod to carry out active learning, the goal is that students can learn to be more participating and not just like a computer program.

Nearpod integration in learning does not only affect the interactive learning process but also increases students' positive attitudes. [13] conducted a study of 190 students to see whether Nearpod integration could improve students' attitudes towards learning. Musa found that students showed a positive attitude when learning was integrated with Nearpod. In more detail, as many as 244 grade 9 students and 7 teachers were studied by [14] to see the potential of Nearpod on student motivation. [14] found that Nearpod can increase student motivation, even Nearpod integration can make learning more interesting and less monotonous.

Interesting and not monotonous learning will make students more interested in participating in learning. This statement is supported by findings [15], as many as 44 students from the financial accounting class were taught using Nearpod, through questionnaires and focus groups it was found that the integration of Nearpod can increase student interest and has the potential to influence their learning outcomes.

[16] found that dental students had better learning outcomes when using the Nearpod platform. At the middle school level, [17] found that Nearpod integration can affect learning outcomes and there is an influence between the use of Nearpod and the level of student collaboration. At the elementary school level, [18] conducted a study of one class in grade 4 to see the potential of Nearpod in the reading group. All students stated that Nearpod could make students more motivated to learn and get more benefits in learning.

From the teacher's point of view, [19] states that the Nearpod integration is very helpful for online learning interactions. Teachers can check students' mistakes and thought processes easily using Nearpod [19]. Similar results were found by [20], a study was conducted to see the potential for applying Nearpod to 100 grade 6 students. [20] found that the Nearpod integration facilitates teachers to monitor and check student understanding in real time. Despite its various potentials, Nearpod's integration in the world of education still needs to be further investigated, as [8] states that it is possible that differences in teaching styles can be variables that affect results.

Table 2 Research included into scoping review

Researcher	M. Hakami [5]	M. A. A. Musa, and J. A. A. Momani [13]	D. Sarginson, and S. McPherson [9]	S. McClean, and W. Crowe [10]	B. Ryan [6]
Year	2020	2022	2021	2017	2017
Title	"Using Nearpod as a Tool to Promote Active Learning in Higher Education in a BYOD Learning Environment." [5]	"University Students' Attitudes towards using the Nearpod Application in Distance Learning" [13]	"Nearpod: An Innovative Teaching Strategy to Engage Students in Pathophysiology/Pharmacology." [9]	"Making room for interactivity: using the cloud-based audience response system Nearpod to enhance engagement in lectures." [10]	"Near Peers: Harnessing the power of the populous to enhance the learning environment." [6]
Subject	74 female university students	190 university students	2 faculty and 48 university students	63 university students	136 first year and 109 second year university students
Country	Saudi Arabia	Jordan	USA and Canada	Nothern Ireland (UK)	Ireland
Method	Mainly quantitative (Mixed-method)	Descriptive-analytical	Qualitative	Qualitative	Mixed-method
Instrument	Questionnaire	Questionnaire	Questionnaire	Questionnaire	Questionnaire
Dependant variable	Active learning	Attitudes	Student Engagement	Student Engagement	student interaction, engagement, and participation
Result	"The findings of the study showed that the affordances of Nearpod and the BYOD model have promoted active learning in the classroom. Students were very satisfied with integrated learning environment, and they commended Nearpod in all courses specially those ones taught by video-conference learning system" [5]	"The results showed that the students had positive attitudes towards using Nearpod. In addition, the results showed that teacher support was the most important variable ($\bar{x}$=3.69)." [13]	"Nearpod helped connect faculty and students during a time when remote learning was required. Grades on examinations stayed consistent or were higher, evenwith the abrupt changes made due to the pandemic. Nearpod could be a good learning tool to meet the new AACN Essentials and the NGN." [9]	"Nearpod and similar products represent a new class of feature-rich audience response systems that have potential to transform learning even in large classes." [10]	In this research, an interactive presentation software was evaluated ashaving a positive impact on the student learning environment and promoted self-responsibility and ownershipwithin the case study cohort." [6]
Suggestions	"Specifically, many researches need to be carried out to determine how the integration of a learning tool with BYOD platform could be used to promote active learning in higher education" [5]	"Conduct more studies on the effectiveness of using and employing modern technologies in university teaching." [13]	"This study perceives that embracing technology as one of the teaching methods through Nearpod can equip students with more practical processes of learning	"We plan to further extend its use, particularly in larger classes (n = ~175 students) where stimulating engagement and promoting active	"Engaging students in an interactive learning environment, inlarge lecture theatre can be difficult and requires judicious curriculum and

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			and discerning of the subject matter." [9]	learning can be a challenge" [10]	pedagogical design" [6]

Table 3 Research included into scoping review

Researcher	N. Shehata, C. Mitry, M. Shawki, and M. El-Helaly [15]	D. M. Messina, S. S. Mikhail, M. J. Messina, I. A. Novopoltseva [16]	T. Měkota, and M. Marada [17]	Y. Qi, E. Shen, and S. Xue [11]	S. Kaddoura, and F. Al Husseiny [8]
Year	2019	2022	2020	2021	2021
Title	"Incorporating Nearpod in undergraduate financial accounting classes in Egypt." (Shehata et al., 2020a)	"Assessment of learning outcomes of first year dental students using an interactive Nearpod educational."	"The influence of the Nearpod application on learning social geography in a grammar school in Czecha." [17]	"Applying Nearpod to 11th Grade to Improve Classroom Interactions." [11]	"An approach to reinforce active learning in higher education for IT students." [8]
Subject	44 university students	University students	High school students	30 11th-grade students.	120 university students
Country	Egypt	United States	Czecha	China	United Arab Emirates
Method	qualitative	Mixed-method	Mixed-method	Qualitative	Quantitative
Instrument	Survey	Survey and student comments	Pre-test, post-test, interview	Observation	Test and questionnaire
Dependant variable	Student interest	Learning outcomes	Learning	Classroom interaction	Interactive learning
Result	"Results from students' survey and focus groups indicated that using Nearpod heightened students' interest in the class and positively affected their learning." (Shehata et al., 2020a)	"Qualitatively, the dental students overwhelmingly expressed support for the ease of use and educational value of the Nearpod platform." [16]	"There were differences in pupils' relationship to digital technologies and in level of collaboration between the classes." [17]	"Through the research, we found that Nearpod provides various perspectives that bring students into Global Warming." [11]	"They responded positively to using Nearpod as a tool for interactive learning, and they recommended that it." [8]
Suggestions	"Future research could assess the influence of using Nearpod in class on students' performance; in other words, to what extent are students' grades different for students' who take online quizzes			"Using electronic equipment to teach is a promising way in the future, and these softwares provide good plate forms to improve the quality of the class." [11]	"As future work, there is a plan to use Nearpod in other courses, such as cybersecurity and programming courses to compare students' level of engagement between different courses and different teaching styles." [8]

Researcher	N. Shehata, C. Mitry, M. Shawki, and M. El-Helaly [15]	D. M. Messina, S. S. Mikhail, M. J. Messina, I. A. Novopoltseva [16]	T. Měkota, and M. Marada [17]	Y. Qi, E. Shen, and S. Xue [11]	S. Kaddoura, and F. Al Husseiny [8]
	versus those who do not?" [15]				

Table 4 Research included into scoping review

Researcher	M. R. Lowry-Brock [12]	H. Peng [19]	Naumoska et al. [14]	M. Janjić, and N. Stojanović [20]	S. Delacruz [18]
Year	2016	2021	2022	2019	2014
Title	"The effect of using Nearpod as a tool of active learning in the high school science classroom." (Lowry-Brock, 2016a)	"Applying Nearpod to 10th-Grade History Courses to Improve Teaching Efficiency." [19]	"Nearpod as a tool for increasing students' motivation for learning chemistry." [14]	"Applicability Of Web Tools: Nearpodand Formative in Teaching of Morphology." [20]	"Using Nearpod in elementary guided reading groups." [18]
Subject	88 high school students	18 10th-grade students	244 9th grade students and 7 teachers	100 6th grade students	A class in 4th grade student
Country	Montana, United states	China	the Republic of Macedonia	Serbia	United states
Method	Qualitative	Qualitative	Mixed-method	Mixed-method	Qualitative
Instrument	Test, Survey, journals, interview	Classroom observation	Questionnaire, interview	Test, and survey	Interview
Dependant variable	Active learning	Teaching efficiency	Student motivation	Teaching method	Learning
Result	"Students and teachers both prefer the active learning opportunities provided by Nearpod. Active learning seems to be a common factor of how much students learn, not a computer program with opportunities for active participation." [12]	"Nearpod is very helpful for online classroom interactions for some perspectives, such as: students can do high-level cognitive tasks; teachers can easily follow up students' thinking and promptly reduce misunderstanding [19]	"The results indicated that Nearpod-based activities positively influenced students' motivation in learning chemistry. Nearpod has a great potential to be applied during the face-to-face teaching as a hybrid model in the future, thus making teaching more interesting and less	"Using Nearpod allowed teacher to activate and monitor the work of all students; to check understanding of the lessons and the acquisition of knowledge in real time" [20]	"An analysis of data revealed that all of the students found this type of guided reading to be beneficial and motivating in learning the content presented through the application. Students also explained how they could transfer the knowledge gained into their independent work." [18]

Researcher	M. R. Lowry-Brock [12]	H. Peng [19]	Naumoska et al. [14]	M. Janjić, and N. Stojanović [20]	S. Delacruz [18]
			monotonous." [14]		
Suggestions					"It is recommended that the Nearpod application be used in guided reading lessons because of its user-friendliness, ability to engage students, and monitor their progress." [18]

IV. CONCLUSION

The research results selected in this study aim to see the effect of Nearpod integration in classroom learning from both the teacher's and student's perspectives. The level of study taken consists of elementary school, middle school, to tertiary institutions from various study programs. There are three research methods used, namely quasi-experimental, qualitative, and mix-method. The instruments used consisted of post-tests, pre-tests, questionnaires, interviews, and surveys. All studies suggest that Nearpod integration has a positive impact on improving learning interactivity, positive attitudes, and learning outcomes, as well as teaching efficiency.

Based on the research results, research using the pre-test and post-test reported that student learning outcomes increased after using Nearpod in learning. Furthermore, based on the questionnaire distributed to students, it was found that Nearpod integration made students more motivated while studying.

Most studies collectively state that the integration of Nearpod into learning can improve interactive learning, student positive attitudes, and learning outcomes. Apart from that, the teachers also stated that the Nearpod integration could improve efficiency in teaching.

The majority of Nearpod development studies are used in science, social, and language learning. The use of Nearpod in mathematics learning is still very minimal, even though the characteristics of Nearpod can be explored for interesting mathematics learning. Maths teachers should start using and developing Nearpod in learning, just as teachers in other fields do.

In the future, it is necessary to conduct research to develop Nearpod in learning so that both teachers and schools can integrate Nearpod when carrying out teaching and learning activities. Even though the pandemic era can be said to be almost over, Nearpod development must still be carried out because future learning can optimize online systems more than offline.

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Agung Prasetyo, S.Pd. is a master's student of mathematics education at Yogyakarta State University. He is an awardee of a fully-funded scholarship from the Ministry of Finance of the Republic of Indonesia called the Lembaga Pengelola Dana Pendidikan (LPDP) scholarship. His research topics include higher-order thinking skills, problem-solving and posing, analogical reasoning, and multimedia development. Currently, he is also pursuing the integration of other fields of science in mathematics learning, such as STEAM education. In addition to researching, he also published collaborative books related to mathematics education. Several collaborative books have been published entitled: Mathematics for Higher Education, Elementary Algebra, Philosophy of Mathematics Education, and Mathematics Learning Strategies. Thanks to the publication of the book, he has obtained 4 intellectual property rights (IPR). He is currently completing his master's final project on the development of interactive multimedia based on the Nearpod learning management system in mathematics learning. In addition to writing, he also actively participated in conference activities. As a master program student, the cumulative score he currently obtained reaches 3.90 from a maximum of 4.0. When he took the undergraduate level, he graduated on time with laude predicate and received an award as one of the best graduates from the judiciary of the mathematics education study program at Surabaya State University. He is active as a member of the LPDP UNY village forum, a member of the Mata Garuda DIY forum and Mata Garuda Jatim. In addition, he is also the founder of the Excellent Academy tutoring institution. Currently, he is actively teaching mathematics and guiding general intelligence tests for scholarship selection, further study, and prospective civil servants.

Dr. Sri Andayani, S.Si., M.Kom. is an academic who works as a lecturer in mathematics education at Yogyakarta State University. He is an associate professor or holds a doctorate. He earned his doctoral degree from Gajah Mada University, Yogyakarta, Indonesia. His area of expertise is technology in learning, especially mathematics learning. He teaches various courses such as computer applications, computer programming, digital technology, databases, and so on. He also produces various teaching material products for lectures such as lecture modules and diktats. He actively publishes scientific papers, and currently he has a SINTA overall score of 427. Based on the website of sinta.kemdikbud.go.id, it has an H-Index of scopus which is 3 and 28 citations, besides that it has an H-Index of Web of Science which is 1 and 2 citations. Meanwhile, his achievements in Google Scholar are 8 H-Index, and 219 citations. He published articles in almost all scopus quartiles from Q4 to Q1, as well as scopus indexed proceedings. He is currently also guiding students to complete final projects such as theses and theses. The relationship between the first author and him is as a supervisor for the final project of the master or thesis level. The articles presented at this conference are part of the final project project. The final project that is being made by the first author is about the development of interactive multimedia LMS Nearpod to improve the problem-solving ability and learning independence of junior high school students.