Effectiveness of technology-based learning with the Nearpod application

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ABSTRACT: This study aims to analyse and determine the effect of using technology-based learning media in education, and specifically the Nearpod application in Indonesian schools. Quantitative experimental research has been employed, supplemented by the Kirkpatrick model in evaluating the use of the Nearpod application. There were two classes involved, namely, the experimental and the control class. There were 312 participants divided into two classes, each class with 156 participants. The participants were selected from 78 schools across Indonesia through random sampling. The practical contribution of this research is to create more awareness about technology-based learning media among educators and encourage more schools to use them. Highlighting the importance of media in teaching to improve student learning outcomes in Indonesia is also a key aim. After the introduction of Nearpod in the experimental class, the highest achieved score was 92, while in the control class it was 88. These results indicate a positive influence of technology-based learning media on student outcomes, specifically with the use of the Nearpod application.

INTRODUCTION

Education is a process of learning knowledge and skills from generation to generation, constantly adjusted, most recently by the inclusion of various learning media. The latest generation is dependent on technology and eager to use it. Technology plays a vital role at the current time, as evidenced by almost everyone in any circumstances having a mobile phone and using it. It appears that some people are willing to lose their traditional wallet rather than their cell phone, which may include electronic access to banking or their electronic wallet. This shows that technology greatly influences everyone's life, as well as education [1]. The issue is whether education keeps up with new developments from generation to generation, including the present extensive and broad use of technology. However, educational institutions in some countries, including Indonesia, are still carrying out the learning process with traditional means. To the younger generation of students, the traditional education is no longer meaningful, and consequently they often lose their learning motivation. Considering this background, educational institutions should become more aware and encourage the teaching staff to use technology as a learning medium more frequently, incorporating the latest developments.

It should be noted that educators can use many technologies, such as various educational applications or platforms, and they can choose them according to their needs and students' requirements. Some considerations in choosing an application as a student learning medium relate to:

- advantages and disadvantages of the media to be used;
- characteristics of students;
- material to be taught to students.

In addition, the learning media chosen must be relevant, efficient and productive [2].

Technology has become ubiquitous, resulting in changes in the world of education, one of which is the application of various computer technologies. Computers are used in office administration at universities, and in preparing material for educational purposes. In this context, facilities and infrastructure are needed to support the learning process in the era of a constantly developing digital world. However, the digital world's development is so fast that many educational institutions may not be aware of the latest advances in multimedia-based learning devices that would enable a more efficient educational process for both the student and the teacher. Also, the devices that are in use may not necessarily comply with the characteristics of, for example, elementary school students in specific environments, so an initial approach is needed [3].

The learning process without the use of learning media may be too abstract for students and lead to misconceptions that hinder their understanding of more complex material. The teacher's role is to ensure that students understand the material

as well as possible. Therefore, it is essential that they use the most appropriate learning media to help students in learning and understanding the material [4].

Learning media are most often defined as tools used in education to convey the learning material. The goal of using learning media is to create a learning experience that is engaging, interactive, motivational, easy to understand and also enjoyable, so that students can fully concentrate and be immersed in the learning process. One example of learning media is the Nearpod application.

The Nearpod application is interactive and learners can achieve good quality learning outcomes by combining several media, such as PowerPoint, digital books and YouTube. Also, students can use Nearpod independently outside the school context. The advantageous features of Nearpod include a virtual reality (VR) display and interactive quizzes in various forms. The drawback of Nearpod is the necessity of the Internet connection for optimal usage. In addition to the free-of-cost version, the Nearpod application has paid features [5].

There are various features in Nearpod that enable combining presentations, documents, inserting PDFs, there are examples of VR display, and others. Nearpod's activity feature is equipped with interactive quizzes, questions that allow to add long answers, memory tests, filling in blanks and answering questions with pictures [6]. Figure 1 demonstrates the initial display of Nearpod, and Figure 2 includes some slides from a slide show.
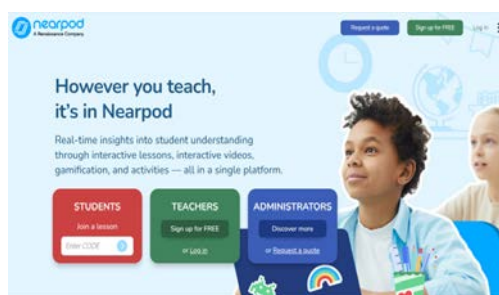

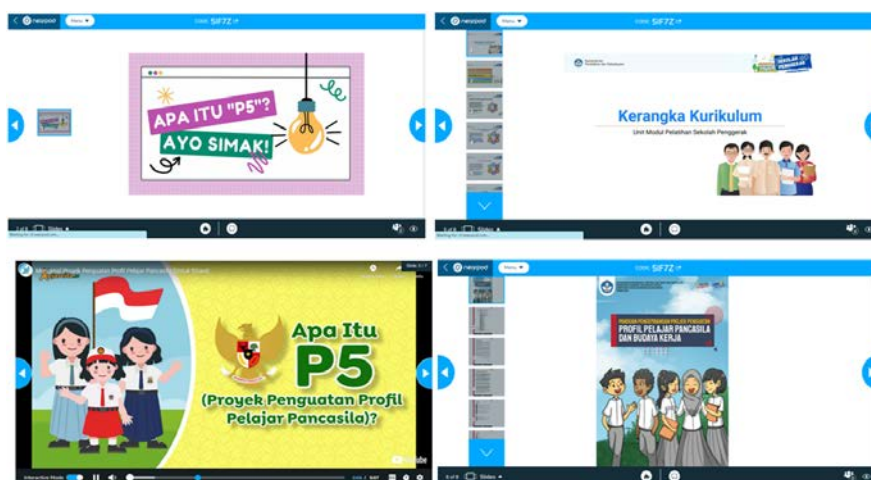Figure 1: Initial display of the Nearpod application.

Figure 2: Slide show in the Nearpod application.

The message conveyed to the recipient through learning media can motivate him/her more the one conveyed traditionally. As mentioned above, learning media create a direct connection between students and learning resources, so that the students can learn independently according to their individual abilities.

One of the main factors that impacts the low scholarly achievement of students is the teacher's lack of ability to create learning media and the teacher's inadequate skills in managing existing media as a means of channelling messages to students and as a sources of messages that can be later conveyed [7]. The use of teaching media can help to achieve learning success. The advantages of learning media are:

1) clarifying the presentation of messages, so that they are clear and concise, and not chaotic or verbose;
2) overcoming the limitations of space, time and human senses;
3) ability to generate enthusiasm for learning;
4) enabling interaction between students, the learning environment and virtual reality;
5) supporting independent learning according to students' abilities and interests;
6) providing the same knowledge, insight and opportunities for students.

Interactive multimedia are particularly helpful in supporting quality learning as the several media usage creates a two-way relationship with the user and the application. Interactive multimedia have an impact that can be applied directly in the media by providing information effectively and precisely, and can increase student enthusiasm for learning interactive multimedia [8]. Instructional media used in an efficient way can develop not only students' abilities but also stimulate their interest in learning through these types of media. Therefore, considering the advantages and educational benefits of learning media, including Nearpod, it appears crucial to use them at every level of education.

The Nearpod application can be accessed in three ways. Firstly, educators and students can use it in live lessons and enter Nearpod simultaneously. Secondly, through a combination of live lessons and Zoom, when educators and students simultaneously access Nearpod through interactive forums, such as Zoom meetings. Thirdly, it can be accessed independently by educators and students in their own time.

As mentioned above, one disadvantage of Nearpod is the need for an Internet network and good connectivity - learners must use mobile phones or laptops. However, using Nearpod reduces the need for liquid crystal display (LCD) projectors, which are anyway not readily available in Indonesian schools. Interactive learning using technology does not always rely solely on the LCD projector.

The use of technology is no longer a secondary need, but has now become a primary need, with some people using it for nearly 24 hours. Technology can be addictive, and many users become dependent on it considering the convenience it offers. Education today is related to technology in many ways, and the teacher is expected to create the appropriate learning media content [9]. Furthermore, once the learning media are in use, it is important to evaluate them in terms efficiency and impact on students. Media evaluation with the Kirkpatrick model goes through four stages: reaction, learning, behaviour and the results of the entire learning process [10].

Learning media are evaluated to improve the learning process by choosing the most suitable media for the material provided. In addition, evaluation is needed to continuously update the currently used technology, and increase innovation and creativity through implementing new media, if appropriate. Further, utilising new technologies in education can increase a sense of curiosity in students and encourage them for more effort in learning.

This study aims to determine the effect of using the Nearpod application as an interactive learning medium that teachers in Indonesia can implement. It has to be noted, that at present only few teachers in Indonesia use the Nearpod application as a learning medium. The practical contribution of this research is to create more awareness about technology-based learning media among educators, and to highlight the media's importance in teaching. The assumption is that using the Nearpod application can improve student learning outcomes in Indonesia.

METHOD

This study was based on quantitative and qualitative data including experimental research methods. The researchers used the experimental method in the form of a pre-test and post-test control group design [11]. In addition, this study applied the Kirkpatrick model with four stages; namely, reaction, learning, behaviour and results [10]. Data were collected through observations, interviews and questionnaires (Google Forms) at selected schools. The aim was to determine the effect of the Nearpod application as a learning medium for school students. The research sample comprised 312 participants from 78 schools in Indonesia selected by random sampling. The study was conducted in 2023 for six months, from January to June.

RESULTS AND DISCUSSION

The data regarding the pre-test and post-test results are included Table 1 and Table 2 below.

Table 1: Comparison of descriptive statistics from the pre-test of the control and the experimental class.

No.	Control class	Average	Experimental class	Average
	Valid	156	Valid	156
	Missing	0	Missing	0
	Mean	63.20	Mean	65.77
	Std. error of mean	1.902	Std. error of mean	1.722
	Median	62.00	Median	66.50
	Mode	60	Mode	56
	SD	10.420	SD	9.431
	Variance	108.579	Variance	88. 944
	Range	44	Range	36
	Minimum	36	Minimum	48
	Maximum	80	Maximum	84
	Sum	1,896	Sum	1,973

Based on the comparison of the descriptive statistics before using the Nearpod application in the experimental class, it can be seen that in the control class, the highest score was 80 and the lowest score was 36. This indicated that students' results were not satisfactory. Whereas in the experimental class the score was 48, and the highest score was 84, which was also not fully satisfactory. The results of this assessment refer to the starting point of the experiment, before any changes were made either in the control or the experimental class.

Table 2: Comparison of descriptive statistics from the post-test of the control and experimental class.

	Control class	Average	Experimental class	Average
No.	Valid	156	Valid	156
	Missing	0	Missing	0
	Mean	74.27	Mean	82.27
	Std. error of mean	1.338	Std. error of mean	1.146
	Median	76.00	Median	82.00
	Mode	76	Mode	80
	SD	7.329	SD	6.275
	Variance	53.720	Variance	39.375
	Range	28	Range	20
	Minimum	60	Minimum	72
	Maximum	88	Maximum	92
	Sum	2,228	Sum	2,468

The comparison of the control and the experimental class included in Table 2 after the post-test, indicates that the highest score in the control class was 88, while the lowest was 60. In the experimental class, the highest score was 92, and the lowest was 72. It can be stated that there are changes and differences between the control and the experimental class. In the control class, the learning process was conducted conventionally without using the Nearpod application. While in the experimental class, the learning process included the Nearpod application. Also, it appears that in the experimental class, learning has become more exciting and enjoyable; students found it easier to accept and understand the learning material with the Nearpod application. Thus, the scores have increased and are categorised as very good.

To test for normality, the Kolmogorov-Smirnov test and the Shapiro-Wilk test were conducted, and the results are included in Table 3.

Table 3: Normality tests' results.

Class	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre-test experimental	0.146	156	0.104	0.958	156	0.267
Post-test experimental	0.141	156	0.132	0.929	156	0.047
Pre-test control	0.144	156	0.113	0.950	156	0.170
Post-test control	0.127	156	0.200	0.965	156	0.409

Table 3 shows the significance value of the Kolmogorov-Smirnov normality test; the experimental pre-test result was 0.104, and the experimental post-test value was 0.132. Furthermore, the average data in the experimental class had a significance of $0.104 > 0.05$ (pre-test) and $0.132 > 0.05$ (post-test). The control class obtained a pre-test result of 0.113 and a post-test value of 0.200. This shows that the control and the experimental class obtained similar results, generally distributed with a significance value of $0.113 > 0.05$ and $0.200 > 0.05$.

The Lavene test was conducted to check the equality of variance in the selected population.

Table 4: Homogeneity test.

	Levene statistic	df1	df2	Sig.
Mean	0.425	1	58	0.517
Median	0.249	1	58	0.620
Median and with adjusted df	0.249	1	52.278	0.620
Trimmed mean	0.422	1	58	0.519

Based on Table 4 it can be seen that that the mean significance value in the experimental and control class is 0.517, meaning that the mean significance value is higher than 0.05 ($0.517 > 0.05$). Thus, the obtained data has a homogeneous distribution. Now, the hypothesis testing results will be outlined.

Based on the results of the paired sample test, it is known that pair 1 in the experimental class obtained a sig. value of $0.000 < 0.05$ and pair 2 in the control class obtained a sig. value of $0.000007 < 0.05$. So, it can be seen that there is an average

difference in the pre-test and post-test scores in the experimental and control class. The average difference between the experimental and control classes is due to the treatment carried out by the researchers - the experimental class used the Nearpod application as a learning medium. At the same time, the control class used only conventional learning methods.

Based on the results, it can be stated that there is an effect of using the Nearpod application as a technology-based learning medium. In the calculation of the effect size test, the result is 1,173. Therefore, the influence of technology-based learning is very high. This is because the Nearpod application can make students active, creative and independent, as well as build their knowledge and skills in learning. So, the students can more easily understand the learning material with the Nearpod application.

Based on these results, it means that teachers, in terms of creating innovations in learning media, can be more successful when using these ones that are based on technology. Teachers can access technology-based learning media from the Internet, however, schools have certain limitations on providing these media. Therefore, teachers should emphasise the necessity of using technology-based interactive learning media in the learning process to support the learning process and its outcomes [12].

The findings of this study reiterate that the factors impacting on effectiveness in the learning process are influenced by the type of the applied media and learning methods.. Based on the results of questionnaires and interviews conducted through Google Forms, and analysis of the teachers' needs in developing Nearpod-based interactive science learning media, it appears that teachers use worksheets as learning media. Some teachers have implemented a student-centred learning model, but they need technology-based learning media to enhance the learning process. Using PowerPoint-based learning media and textbooks can support students in carrying out independent learning, however, there is also a need for innovation and introduction of new media to the learning process, such as Nearpod, so that students can study independently, at any time they choose.

CONCLUSIONS

Based on the results of this study, it can be concluded that there is a positive effect of using technology-based learning media, specifically the Nearpod application on student learning outcomes. In addition, this study used the Kirkpatrick model including four stages to obtain results from the research.

First, the observation of students' reactions when using the Nearpod application in the learning process indicated more interest and enthusiasm than when they learned with the conventional method. Second, is the learning stage, the researchers observed and assessed students' understanding of the material to measure their progress after introducing the Nearpod application. The third stage relates to behaviour. Namely, the researchers observed students in terms of attitudes and student activity in the learning process using the Nearpod application. The fourth stage is the result, where the researchers evaluated the stages carried out in the learning process with the Nearpod application.

Based on the results, it can be stated that the Nearpod application can be utilised and is suitable as a technology-based learning medium for school students at this time. The many advantages of Nearpod support this suitability. In addition, in Nearpod interactive quality learning can be achieved by combining several types of media, such as PowerPoint, digital books and YouTube. Based on the analysis of the presented data the influence of the Nearpod application is evidenced by student learning outcomes and their motivation. The experimental class obtained an average score higher than the control class of 92 > 88.

When observing the learning process with Nearpod, the researchers noticed a high enthusiasm for learning, a better understanding of learning material and enjoyment in independent study. The researchers have also assessed the reactions, learning, behaviour and overall results when using Nearpod. The student learning outcomes have increased and students tended to get above-average scores.

It is hoped that further research will encourage innovation and take advantage of the latest technological developments, so that the most optimal learning media could be chosen according to students' characters and learning content. The Nearpod application is just one of the latest technology-based learning media, but other media could also be considered. In regard to Nearpod, further research is needed regarding the factors that influence its successful use in improving student learning outcomes in the context of Indonesian schools.

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