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The Influence of the Padlet-Assisted Discovery Learning Model on Students' Digital Literacy Skills in the Respiratory System

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ABSTRAK

Kemajuan teknologi informasi menuntut peserta didik memiliki kemampuan literasi digital yang baik agar mampu mengakses, mengevaluasi, dan memanfaatkan informasi secara efektif dalam proses pembelajaran. Tujuan penelitian ini adalah untuk mengetahui pengaruh model discovery learning berbantuan Padlet terhadap kemampuan literasi digital peserta didik pada materi sistem respirasi di kelas XI SMAN 1 Cikatomas. Metode penelitian yang digunakan adalah quasi experiment dengan desain posttest only control group. Populasi penelitian meliputi seluruh kelas XI dengan sampel yang ditentukan melalui purposive sampling, terdiri atas satu kelas eksperimen dan satu kelas kontrol. Instrumen penelitian berupa angket literasi digital yang telah divalidasi. Analisis data dilakukan menggunakan uji One Way ANOVA. Hasil penelitian menunjukkan adanya perbedaan signifikan antara kelas eksperimen dan kelas kontrol pada kemampuan literasi digital. Dengan demikian, dapat disimpulkan bahwa penerapan model *discovery learning* berbantuan Padlet berpengaruh positif terhadap kemampuan literasi digital peserta didik pada materi sistem respirasi.

Kata kunci: Discovery Learning; Padlet; Literasi Digital

ABSTRACT

The advancement of information technology requires students to have good digital literacy skills to be able to access, evaluate, and utilize information effectively in the learning process. The purpose of this study was to determine the effect of the Padlet-assisted discovery learning model on students' digital literacy skills on the respiratory system material in grade XI of SMAN 1 Cikatomas. The research method used was a quasi-experimental with a posttest-only control group design. The study population included all grade XI with samples determined through purposive sampling, consisting of one experimental class and one control class. The research instrument was a validated digital literacy

questionnaire. Data analysis was carried out using the One Way ANOVA test. The results showed a significant difference between the experimental class and the control class in digital literacy skills. Thus, it can be concluded that the application of the Padlet-assisted discovery learning model has a positive effect on students' digital literacy skills on the respiratory system material.
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Keywords: Discovery Learning; Padlet; Digital Literacy

INTRODUCTION

The development of information and communication technology in the digital era demands digital literacy skills as one of the main competencies of students. (Rahmawati, 2023). Digital literacy is defined as the ability to use information technology to access, understand, evaluate, and utilize information critically (Sunara Akbar et al., 2024). In the context of education, digital literacy encompasses more than just technical skills; it also encompasses critical thinking skills, ethical use of technology, and creativity in utilizing digital media as a learning resource. Therefore, digital literacy is seen as a crucial factor in supporting students' adaptation to 21st-century developments in knowledge and skills (Naufal, 2021). In the context of education, digital literacy is important to support students in keeping up with scientific developments.

Digital literacy is increasing along with technological developments that have changed the way students learn. Digital literacy skills enable students to be more independent in accessing information, develop critical thinking skills, and avoid the negative impacts of technology misuse such as hoaxes and plagiarism. According to research conducted by the Central Statistics Agency (BPS) in 2020, internet usage by students reached 59.33%, an increase from 33.98% in 2016. This increase occurred at all levels of education in Indonesia. At the elementary school level, it increased to 35.97%, at the junior high school level to 73.4%, and at the senior high school level to 91.01% (Febrian & Febriani, 2023). With the increasing use of technology in the learning process, students are required to understand how to use and access digital resources. In today's era of globalization and technological advancement, digital literacy is crucial for students, helping them not only access information quickly but also select credible information and avoid the spread of fake news (Fahman, 2024).

However, the research results Oktavia & Hardinata, (2020) The results show that high school students' digital literacy skills are still classified as low to moderate, with 35.5% having low scores and 51.7% having sufficient scores. A similar situation is seen in biology learning, where student learning outcomes are still below the Minimum Completion Criteria, partly due to the use of monotonous learning models such as student worksheets (Puspita et al., 2017). Biology is a science subject that demands high-level thinking skills because it contains many abstract concepts. Students often struggle to connect concepts, understand biological mechanisms, and relate theory to real-world phenomena. For example, in the often-challenged topic of

the respiratory system, students need to understand the flow of gas exchange, the working mechanisms of organs, and the factors that influence them (Panjaitan et al., 2020). This indicates the need for learning innovations that can improve digital literacy as well as students' biology learning outcomes.

Several previous studies suggest the implementation of innovative technology-based learning models Cahyati, (2019) proves that the Discovery Learning model can improve digital literacy and student learning outcomes in the sensory system sub-material, especially in the syntax of data collection and verification because both arenas directly require students to access and evaluate digital information, manage and present data with the help of technology and think critically about the sources and content of digital information. Meanwhile, Syarofah et al., (2024) research shows that the use of Padlet in problem-based learning can improve students' interest and cognitive learning outcomes. Padlet, as a collaborative medium, allows students to discuss, share ideas, and construct knowledge collaboratively, thus aligning with the principles of student-centered learning. However, research integrating the Discovery Learning model with Padlet, particularly on the respiratory system, is still very limited. This indicates a research gap that can be filled to develop digital literacy while improving students' biology learning outcomes.

Based on initial observations made in SMA Negeri 1 Cikatomas, Data regarding students' digital literacy skills were obtained through the distribution of a digital literacy questionnaire developed based on indicators from Gilster, (1998), that are internet searching, hypertextual navigation, content evaluation and knowledge assembly. The questionnaire consisted of a number of statements with a Likert scale of 1–5 completed by 11th grade students. The results of the questionnaire were then calculated using the percentage achievement formula. The calculation resulted in an average score of 54.76%, indicating that students' digital literacy level is relatively low (category ≤ 60%). Interviews with biology teachers also revealed that students' digital literacy is low due to the use of conventional learning models, insufficient technology involvement, and the inability to optimally activate students' roles. This condition further emphasizes the need for innovative efforts in biology learning to improve the quality of students' digital literacy skills. Therefore, this study aims to determine the effect of implementing the Padlet-assisted Discovery Learning model on students' digital literacy skills in the respiratory system material in SMA Negeri 1 Cikatomas.

METHODS

The research used was *quasi experiment* with *The Matching Posttest Only Control Group Design.* In this design, no pretest was conducted, but only a posttest was conducted to compare learning outcomes between the two groups after the treatment was given. This research was conducted at SMA Negeri 1 Cikatomas in the odd semester of the 2024/2025 academic year with the research subjects being students in class XI IPA. The population in this study was all 173 students of class XI IPA. The sample was determined using a purposive sampling technique based on the criteria of ownership of technological devices that support digital learning. From

these criteria, two classes were selected: XI IPA 3 as the experimental class and XI IPA 4 as the control class. These classes were selected based on the recommendations of their biology teachers and had relatively balanced average learning outcomes. The research instruments used included a Likert-scale digital literacy questionnaire to measure students' digital literacy skills. Data collection was carried out by distributing the digital literacy questionnaire to determine the level of students' digital literacy skills. The data obtained were then analyzed using analysis prerequisite tests in the form of normality and homogeneity tests, followed by hypothesis testing using an independent t-test to determine differences in learning outcomes and digital literacy skills between the experimental and control groups. Data analysis was carried out using the statistical application SPS.

RESULTS AND DISCUSSIONS

This study aims to determine the effect of the Padlet-assisted discovery learning model on students' digital literacy skills in the respiratory system at SMA Negeri 1 Cikatomas. The classes used in this study were grade XI-3 as the experimental class and grade XI-4 as the control class. This study is expected to provide an overview of the distribution of data obtained from the field during the implementation of research activities.

The posttest results of digital literacy skills in the experimental and control classes were then analyzed through prerequisite tests including normality and homogeneity tests. These tests aim to ensure that the data is normally distributed and homogeneous, so that the data meets the requirements to proceed to the hypothesis testing stage with One Way Anova. The normality test used was the Kolmogorov-Smirnov test with the help of IBM SPSS software version 25. for Windows. After the normality test was carried out, the digital literacy skills of the posttest data significance value for the experimental class was 0.058 and the control class was 0.200. Overall data shows a normal distribution, because the significance value is more than 0.05. The following results of the normality test are presented in table 1.

Table 1. Normality Test of Digital Literacy Skill

	Data	Kolmogorov-Smirnov Statistic	df	Sig.
Digital Literacy Skills	*Posttest* experimental class	0,146	35	0,058
	Posttest control class	0,092	36	0,200

Table 2 show the homogenity test describing that the posttest significance value for digital literacy skills was 0.527. This indicates that the data is homogeneous because both posttest significance values were greater than 0.05.

Table 2. Homogenity Test of Digital Literacy Skill

	Data	Levene Statistic	df1	df2	Sig
Digital Literacy Skills	*Posttest* experimental class	0,405	1	69	0,527

The prerequisite test results indicate that the data comes from a normally distributed and homogeneous population. Therefore, the data meets the requirements for further analysis using One-Way ANOVA. The results of the One-Way ANOVA test are presented in Table 3 below.

Table 3. ANNOVA Test of Digital Literacy Skill

	Sum of Squares	*df*	*Mean Square*	*F*	*Sig.*
Digital Literacy Skills	2900, 376	1	2900,376	43,800	0,000

Based on the results of the data analysis in Table 3, a significance value of 0.000 (<0.05) was obtained. This indicates that H_0 is rejected and H_a is accepted. Thus, it can be concluded that there is a significant influence of the Padlet-assisted discovery learning model on students' digital literacy skills in the respiratory system material in class XI of SMA Negeri 1 Cikatomas in the 2024/2025 academic year.

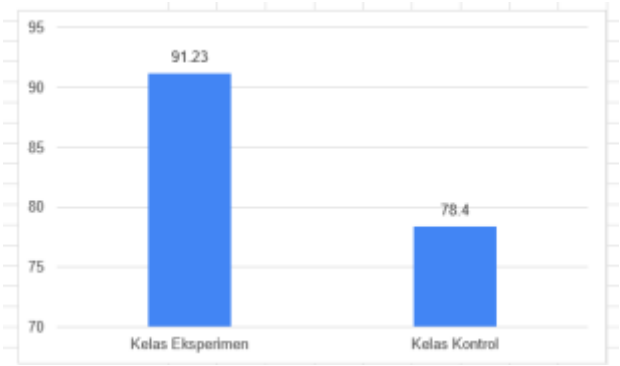

Figure 1. Diagram of Differences in Average Scores of Digital Literacy Skills

Figure 1 shows the average score of digital literacy skills in the experimental class and the control class. Based on the diagram, it can be seen that the average digital literacy skills score of students in the experimental class has an average score of 91.2, while in the control class has an average score of 78.4. So the experimental class is higher than the control class. This score indicates that there is an influence of the Padlet-assisted discovery learning model on the digital literacy skills of students at SMA Negeri 1 Cikatomas.

This is due to the Padlet-assisted discovery learning model for digital literacy skills. This model guides students to independently discover concepts through the stages of stimulus, problem identification, data collection, data processing, proof, and conclusion drawing (Tarbiyah, 2025). When these stages are combined with Padlet's features, the information-seeking and problem-solving process becomes more structured and engaging. Students can upload their findings in various formats, such as text, images, and videos, and provide feedback on other groups' work. This not only improves students' digital literacy skills but also deepens their understanding of the learning material (Novatrasio Sauduran et al., 2024).

The average posttest scores for each learning outcome indicator for the experimental and control classes are presented in Figure 2.

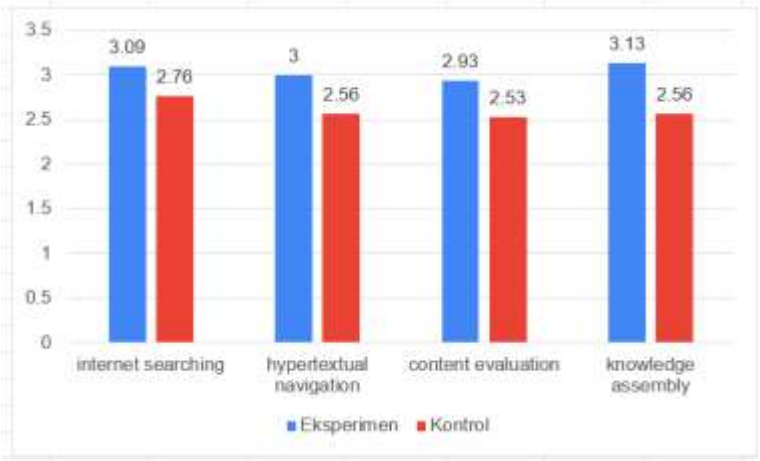

Figure 2. Average Score Per-Indicator of Digital Literacy Skills

Based on the data in Figure 2, it shows the average score of the digital literacy ability indicator. It shows that the posttest score of the experimental class' digital literacy is greater than the control class. This occurs because there are differences in treatment between the experimental class and the control class. The experimental class uses a discovery learning model assisted by Padlet while the control class uses a discovery learning model without the help of Padlet. The value of students' digital literacy abilities is obtained from a test conducted after all the material on the human respiratory system has been delivered. The posttest of digital literacy abilities is given based on four indicators according to Gilster (1998) that are internet searching, hypertextual navigation, content evaluation and knowledge assembly.

Internet searching indicator from experimental class obtained a score of 3.09 while the control class obtained a score of 2.76 so that the experimental class obtained a higher score than the control class because the score obtained by the experimental class was close to the maximum score of 4, meaning that students in the experimental class were more skilled in searching and finding information via the internet compared to the control class. These improvements in skills are inseparable from the implementation of the Padlet-assisted discovery learning model. In the experimental class, students actively searched for additional data online related to the problems posed in the Student Worksheets (LKPD) uploaded via Padlet during

data collection. They then uploaded their findings to Padlet. Through this activity, students practiced selecting relevant and reliable information from various digital sources. Meanwhile, in the control class, data collection was conducted through a PowerPoint presentation containing material and a limited number of references prepared by the teacher. In line with this, Purwanto et al., (2024) found that the use of Padlet in the discovery learning model provides a more challenging learning experience and motivates students in searching for and managing digital information. Besides, Purba et al., (2024) stated that the use of Padlet in learning helps students in collecting and selecting information independently, which contributes to improving information search skills via the internet.

Hypertextual navigation indicator from experimental class obtained a score of 3.00 while the control class obtained a score of 2.56 so that the experimental class obtained a higher score than the control class because the score obtained by the experimental class was close to the maximum score of 4, meaning that students already understand navigation or direction guidance in a web browser. Because in this experimental class in the problem identification syntax, students were given the opportunity to ask and write questions that had been provided in the comments column provided in Padlet. While in the control class, student activities at the problem statement stage were still limited to writing questions based on the slide show presented by the teacher. Because the learning resources were not interactive and did not allow students to explore links or other digital sources, the increase in digital literacy in the hypertextual navigation aspect was not optimal. This is in line with Surya Purba et al., (2024) showing that Padlet can help students access and manage information, which is an important indicator of digital literacy. This aligns with activities in the experimental class that allowed students to ask and write questions in the Padlet comments section, thereby improving their understanding of hypertextual navigation.

The experimental class's content evaluation indicator obtained a score of 2.93, while the control class obtained a score of 2.53, so the experimental class obtained a higher score than the control class, meaning that students were able to identify, assess, and filter relevant information. The learning process in the data processing and verification syntax encouraged students to think critically in assessing the suitability of the data collected in the previous stage. Students then compiled the results of the analysis and discussed them with friends on Padlet, thus creating collaborative interactions between students.

Meanwhile, in the control class, the teacher also guided students in analyzing data, but the process was still limited to oral discussions in class without the use of interactive media like Padlet. Students wrote down their analysis results conventionally on worksheets or notebooks. Although critical thinking activities continued, students' digital literacy levels were not optimally developed because they were not directly involved in the process of evaluating and sharing information through digital sources. Fauzia et al., (2023) stated that using Padlet as a learning medium can improve students' critical thinking skills. Through collaborative activities

such as discussing, analyzing, and verifying information on Padlet, students become more active and are able to assess information more accurately.

The knowledge assembly indicator of the experimental class obtained a score of 3.13 while the control class obtained a score of 2.56 so that the experimental class obtained a higher score than the control class because the score obtained by the experimental class was close to the maximum score of 4, meaning that students are already quite capable of compiling information obtained from various available sources which will then be used in answering a problem. In the syntax of verification (proof) and generalization (drawing conclusions) in their learning, students carry out the process of proving the hypothesis that has been made previously by comparing the results of the findings and data obtained. Through discussion and reflection activities in Padlet, students mutually confirm the truth of the concepts found until finally they are able to draw conclusions independently. This process encourages students to link new knowledge with existing knowledge, so that their knowledge assembly or knowledge compilation and integration abilities increase significantly.

Meanwhile, in the control class, proving and drawing conclusions continued conventionally, using teacher guidance and slide shows. Students tended to passively accept the information presented without much exploration or in-depth discussion. Consequently, knowledge assembly skills in the control class were not as optimal as in the experimental class, as the learning process was more one-way and limited to the material presented by the teacher. Purwanto et al., (2024) describes that menunjukkan bahwa the use of Padlet in the discovery learning model can increase student learning engagement, which is part of the knowledge assembly indicator. With this medium, students are more motivated to discover and construct concepts independently. In line with research by Cahyati et al., (2019) students' digital literacy showed that the average score for knowledge assembly in the experimental class was indeed higher than in the control class. The highest score in the experimental class was also found in knowledge assembly competency, which is influenced by learning models such as discovery learning, where data collection and discussion activities significantly support knowledge processing and assembly.

CONCLUSION AND RECOMMENDATION

Based on the research results, it can be concluded that the Padlet-assisted Discovery Learning model has a positive influence on students' digital literacy skills in the respiratory system material in grade XI of SMA Negeri 1 Cikatomas in the 2024/2025 Academic Year. This influence is evident from the significant difference between the average scores of the experimental class and the control class, in the digital literacy aspect. The results of the hypothesis test using One Way ANOVA showed a significance value of 0.000 (<0.05), which means that H_0 is rejected and H_a is accepted, so the use of the Padlet-assisted Discovery Learning model is statistically proven effective. The application of Padlet media in every Discovery Learning syntax encourages students to be more active in accessing, processing, and evaluating digital information, thereby improving their digital literacy skills. Thus,

the Padlet-assisted Discovery Learning model can be used as an alternative innovative learning strategy that not only improves cognitive learning outcomes but also fosters critical thinking skills and digital literacy in the 21st-century learning era.

Further research is recommended to apply the Padlet-assisted Discovery Learning model to different materials and levels to achieve more comprehensive results. Teachers can also develop creativity in using Padlet features to make learning more interactive and encourage continuous improvement in students' digital literacy.

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