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Improving PGSD Students' Digital Literacy Through Interactive Multimedia-Based PBL

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Abstract

This research is motivated by the lack of students' ability in digital literacy, and students are less active in learning. This study aims to determine the improvement of literacy skills and student constraints in using interactive multimedia-based problem-based learning models. The research method used is a mixed method with a sequential explanatory design. The subjects in this study were 36 PGSD studentsat a private university in Cimahi city. The data collection process was obtained from test questions, and student response questionnaires. The data collection techniques used are tests, interviews and observations. Data analysis is carried out with a quantitative approach, namely the t-test and a qualitative approach by coding and reducing data. The results showed that using the interactive multimedia-based problem- based learning model obtained an n-gain analysis of 76% with an effective category, and had an effect on the acquisition of students' average scores from the pretest and posttest process which initially amounted to 67 to 88.5. This shows that the interactive multimedia- based problem-based learning model can improve students' digital literacy. The findings are expected to contribute to university education to improve technological and interactive digital- based learning.

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INTRODUCTION

Digital literacy is the human ability to understand, create, obtain, or utilize digital resources, including interdisciplinary, general, and creative literacy (Becker et al., 2017). UNESCO believes that digital literacy is reflected in entrepreneurship or work using digital technology or tools to obtain and manage information (Chen et al., 2024). Some problems arise regarding the readiness to accept and use technology related to behavior. In this context, digital literacy requires knowledge readiness to access and process information (Desmaryani et al., 2024). This digital literacy ability is not just about the ability to use digital devices and information effectively (Anthonysamy, 2020), digital literacy also includes demonstrating cognitive and social

emotional abilities when working on tasks online (Lilian, 2022). Digital literacy is a must for students at all levels of education (Green, 2020).

In the digital era, digital literacy skills are one of the most important competencies to be possessed by students of the Primary School Teacher Education (PGSD) Study Programme. The expected conditions include several key aspects that must be mastered by students to ensure students are ready to face the challenges of the digital world and are able to integrate technology

in the learning process. PGSD students are expected to have a comprehensive mastery of

technology and digital devices. This includes the ability to operate various technological devices such as computers, tablets, and mobile devices, as well as using various applications and software that are relevant in the educational context (Gahlot & Bhumika, n.d.) In addition, students must be able to solve basic technical problems and understand how the technology they use works. Furthermore, PGSD students must also be able to use the internet effectively and wisely (Nuroh & Liansari, 2024) Students must be able to search, evaluate, and manage information found online Students must have the skills to assess the credibility of information sources, understand how to use search engines optimally, and be familiar with concepts related to security and privacy in the digital world. These skills are very important to ensure that students can access accurate and relevant information and protect themselves and students from potential risks in cyberspace (Eliaumra et al., 2024)

good digital literacy, especially referring to the ability to use digital technology to filter, integrate, and use information to solve practical problems. Digital literacy here refers to the ability to use digital skills, integrate and recreate information, and foster students' ability to use clear language logic and critical thinking to communicate and solve problems (Chen et al., 2024). The digital literacy skills possessed by students greatly support the curriculum and enable educational institutions to prepare their graduates/future workforce for a technology-enabled workplace (Reddy et al., 2023). Some problems related to students' digital literacy and learning include learning that has not adapted its curriculum structure and teaching methodology to effectively meet the unique characteristics of students (Francisco-Ignacio et al., 2022), weak digital literacy in terms of understanding, obtaining, and using information to solve problems (Desmaryani et al., 2024), and limited access to information on campus and devices (Imjai et al., 2024).

In addition, PGSD students are expected to be able to develop quality digital content. Students must have the skills to create multimedia presentations, educational videos, blogs, and other types of digital content that can be used to support the learning process. This ability allows students to deliver learning materials in a more interesting and interactive way, so as to increase student involvement in the learning process (Nurhayati et al., 2020). The ability to integrate technology in learning is also an important aspect of ideal digital literacy. PGSD students must be able to design and implement learning strategies that utilise technology to increase interactivity and learning effectiveness (Tirtoni et al., 2020). This includes using digital tools to design project-based learning, collaborative learning and problem-based learning. Thus, students can create a learning environment that is more dynamic and relevant to the needs of students in the 21st century. Digital literacy includes critical and creative thinking skills (Ririen & Daryanes, 2022). By utilizing technology, such as the use of interactive software, learning applications, or online learning platforms, PGSD students can increase interactivity in the classroom. This has the potential to increase student participation and deepen their understanding of the subject matter. In

addition, technology can provide new and more effective ways of delivering material, such as through learning videos or simulations, which can make learning more interesting and in-depth.

Students must be able to critically analyze information, identify bias, and make evidence-based decisions (Dinata, 2021). According to (Akbar et al., 2022). Students must also be able to use technology to solve problems and create innovative solutions in an educational context. Creative thinking skills allow students to design interesting and challenging learning activities, which can motivate students to learn. PGSD students are not only ready to face the challenges of the digital era but also able to transfer these abilities to elementary students, creating an innovative and interactive learning environment (Ramadhan, 2021). Students can become leaders in digital transformation in education, improve the overall quality of education, and prepare future generations who are digitally literate and ready to face global challenges.

Based on interviews, the reality in the field shows that the digital literacy skills of PGSD students are still far from expectations. Due to the lack of a monotonous learning model because students only present so that students are not given space to ask questions and understand more optimally, besides that the lecturer's presentation only provides a lecture model so that students' motivation to learn is often low due to conventional teaching methods which are considered less interesting, so that active participation in class is also low. besides that some students lack mastery of technology, making students not confident in using learning tools due to lack of digital literacy, limited learning resources, such as teaching materials that are not yet of high quality and inadequate technological devices, are often an obstacle (Hasanah & Sukri, 2023). limited teaching practice experience makes students less confident, especially in integrating technology. The main problem faced in improving the digital literacy of PGSD students is the ineffectiveness of conventional learning models in accommodating dynamic and evolving digital literacy needs. Conventional learning models that are often used in the classroom tend to focus on the lecture method which involves less interaction and active use of technology. As a result, students are less trained to apply digital technology in real learning contexts, which has an impact on students' low digital literacy skills.

PGSD students often face difficulties in evaluating information they find on the internet. Students lack training in assessing the credibility of information sources, which is important in an era where false information and hoaxes are widespread. This shows that there is a gap between the expected digital literacy skills and the actual skills possessed by students (Satria Ramadhan, M., Diah Apriliani, S., Sahda Firjatullah, N., 2023). This gap not only hinders students' ability to use technology effectively in learning, but also limits their ability to guide students in developing essential digital literacy skills. Furthermore, the challenges faced by PGSD students in integrating technology into the teaching-learning process also reflect a lack of skills in designing interactive and technology-based learning. Many students do not feel confident or skilled in using digital tools to design innovative learning activities (Jefri Susanto Manik, 2022). This creates a situation where digital technology is underutilised in education, so the full potential of technology to improve the quality of learning cannot be realised. Existing learning approaches often do not provide space for students to think critically and creatively. Existing learning models do not encourage students to analyse information in depth or to seek creative solutions to problems. As a result, students are not familiar with learning methods that emphasise problem solving,

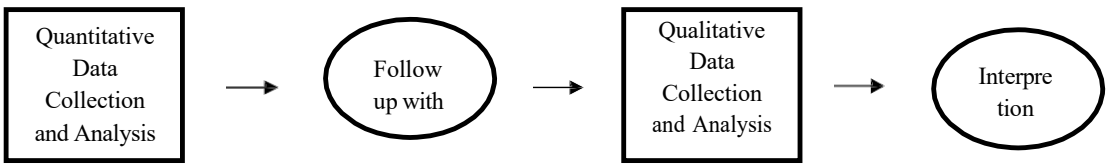
collaboration, and the use of digital technology as an important tool (Rahayuningsih, Nurasrawati, 2022).

So to face these challenges, it is important to develop learning models that are more adaptive and relevant to digital literacy needs. Interactive multimedia-based Project-Based Learning (PjBL) model is a potential solution to overcome this problem (Rahmayanti et al., 2023) This model is expected to provide a more personalised, interactive and relevant learning experience, and support the development of comprehensive digital literacy skills for PGSD students.

The interactive multimedia-based PjBL model offers several advantages. Firstly, this model allows students to learn through real projects that are relevant to the context of students' lives, thus increasing motivation and learning engagement (Agusdianita, Supriatna, 2023).Second, the use of interactive multimedia helps students understand complex concepts through visualisation and direct interaction with learning content. Thirdly, this model can be adapted and tailored to the individual needs of students, providing a more personalised and effective learning experience (Ayunda & Alberida, 2023). In addition, this model also supports the development of critical and creative thinking skills, which are very important in the context of 21st century education. With this approach, PGSD students can be better prepared to integrate technology in the teaching-learning process and improve students' digital literacy skills. The development of an interactive multimedia-based PjBL model specifically designed to improve the digital literacy of PGSD students. The focus of this research is to evaluate the effectiveness of the model in improving students' digital literacy skills and to identify factors that contribute to the successful implementation of this model.

METHOD

The research method applied in this research is mix method. Mix method is a mixed research method that combines quantitative research with qualitative research to obtain complete and broader conclusions (Creswell & Creswell, 2017). This research uses a sequential explanatory design. This design has a characteristic, namely, collecting quantitative data and analysing it then continuing with qualitative data collection which serves to strengthen the results of the research at the beginning. The following is a sequential explanatory design:



Source: Creswell & Creswwell (2017)
Figure 1. *Sequential Explanatory Design*

The quantitative method in this study is an experiment with a *one group pretest-posttest* design. The *onegroup pretest-posttest* design is as follows:

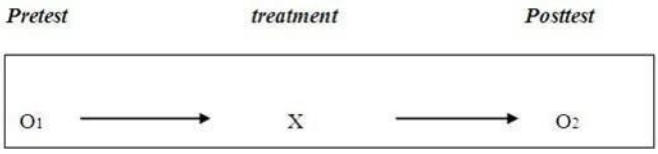


Figure 2: *One Group Pretest-Posttest* Design

Based on this figure, O1 before X is a *pretest* regarding Interactive Multimedia, X in the figure istreatment, namely, the use of the *Problem-based Learning* model during learning and O2 after X is a *posttest* regarding the Digital Literacy Skills of PGSD Students. The research sample was 36 PGSD students in semester 5. The sampling technique used in this study is purposive sampling. The sample was taken with the consideration that these students were studying the Digital Learning course. The instruments used in this study were test instruments and questionnaires. In this study there are two types of data processing, namely, quantitative data processing using inferential statistics assisted by SPSS 23. Researchers carried out a normality test for the prerequisite test and thencontinued with the N-Gain test to measure effectiveness in improving learning outcomes, whereas, qualitative data processing uses three stages, namely, data reduction, data presentation, and conclusion drawing or data verification.

RESULTS AND DISCUSSION

Results

This research collected quantitative data obtained through two stages of digital literacy tests, namely pretest and posttest, while qualitative data was obtained from the results of distributing questionnaires to students. The results of research from data collection in the field will be presented as follows:

To measure critical thinking skills, a test was given in the form of description questions before and after learning using the problem-based learning model. The results of the pretest and posttest are presented in the following graph.

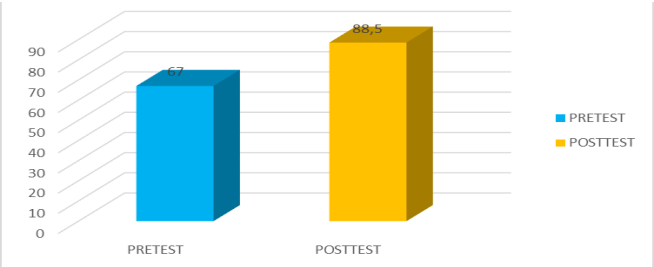


Figure 3. Graph of *Pretest* and *Posttest* Results of Students' Digital Literacy Skills

Figure 3. shows that the average value of the pretest results is 67, while the posttest gets a value of 88.05. From the graph there is an increase from the pretest and posttest results.

Furthermore, the normality test analysis was carried out, the aim was to see whether the data that had been collected had a normal distribution or not. Here are the results:

Table 1. Normality Test Results

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	,139	36	,075	,964	36	,290
Posttest	,158	36	,023	,942	36	,057

a. Lilliefors Significance Correction

The normality test used is Shapiro-Wilk, because the number of samples is less than 50 people. The result of the significant value of the pretest is 0.290 as shown in table 1. The resulting significance value is > 0.05, so the data distribution meets the assumption of normality. Furthermore, for the posttest the significant result is 0.057. From these results, both pretest and posttest data are normally distributed. The next step is the t-test, the details are in the table below.

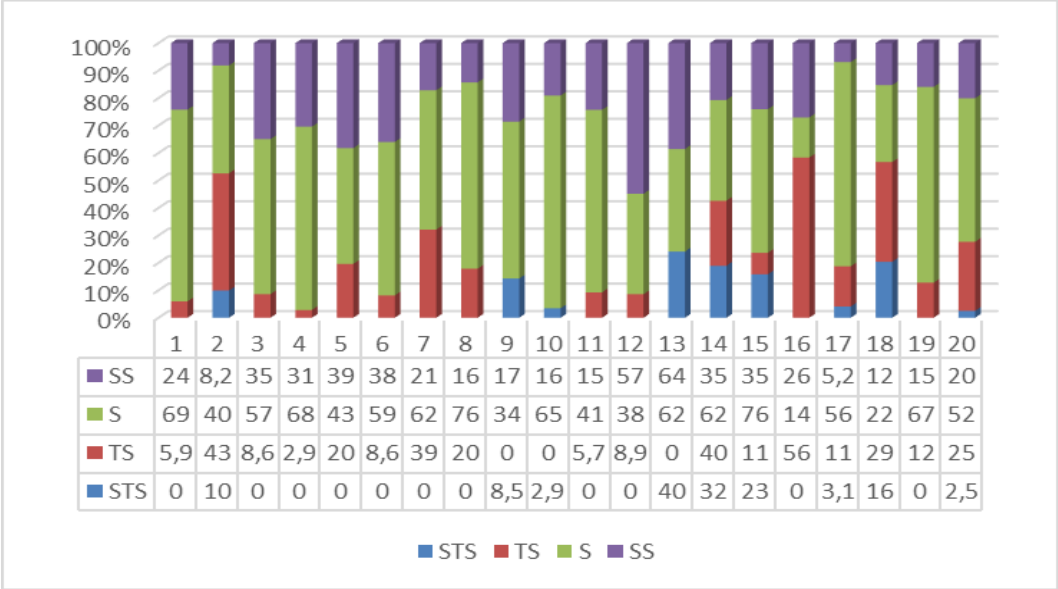
Table 2. T Test Result

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Pretest - Posttest	-17.000	5.127	1.324	-19.839	-14.161	-12.842	34	.000

Table 3. N-Gain Test Results

	N	Minimum	Maximum	Mean	Std. Deviation
NGain_Skor	36	,58	1,00	,7680	,12317
NGain_Persen	36	57,63	100,00	76,7969	12,31735
Valid N (listwise)	36				

Based on the table above, the average n-gain obtained is 0.76 or 76%. The achievement is in the interpretation of the high category and the percentage of n-gain is effective. It can be concluded, from the results of the analysis using the normality test and n-gain that there is an increase in students' digital literacy skills using the interactive multimedia-based problem-based learning model. Meanwhile, based on the distribution of student questionnaires, it is known as follows:



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SS	24	8,2	35	31	39	38	21	16	17	16	15	57	64	35	35	26	5,2	12	15	20
S	69	40	57	68	43	59	62	76	34	65	41	38	62	62	76	14	56	22	67	52
TS	5,9	43	8,6	2,9	20	8,6	39	20	0	0	5,7	8,9	0	40	11	56	11	29	12	25
STS	0	10	0	0	0	0	0	0	8,5	2,9	0	0	40	32	23	0	3,1	16	0	2,5

Graph 2. Recapitulation of PGSD Student Response Results

Based on the graph above, students' responses to learning problem-based learning models can be seen from statement 12, Students like this learning because it is carried out using interactive multimedia so that problems are solved properly, besides that the PBL method used by students is required to collaborate in solving a problem.

Difficulties in the second indicator can be seen from statement number 9 which is a positive statement, more student responses choose alternative answers strongly disagree. So from these results it can be seen that some students still find difficulties in learning if they do not use the interactive multimedia-based PBL model, the conclusion is that based on the results of the questionnaire students strongly agree that learning using the interactive multimedia-based Problem Based Learning model can improve students' digital literacy skills.

Discussion

Based on the results of the study, it is known that student pretest and posttest scores. Based on the total number of 36 students, in the pretest assessment students get an average score of 67. While in the posttest assessment, students get an average score of 88.5 this proves that learning using the interactive multimedia-based Problem Based Learning model can improve students' digital literacy skills. This finding is in line with the research of (Nurcahyo et al., 2020) that learning using multimedia provides a learning experience.(2020), that learning using multimedia provides a more meaningful learning experience. Interactive multimedia is a combination of various types of media (text, images, sound, video, and animation) that are used simultaneously and allow users to interact with the content presented, The use of interactive multimedia for students can increase engagement, understanding, and retention of material. This is in line with the opinion of respondents who stated:

“That PBL helps in improving digital literacy skills, especially in terms of understanding and problem solving abilities after digital information literacy.”

Interactive multimedia creates a dynamic learning environment and allows students to learn in a more participatory and collaborative way in line with (Hayati,Armanto, 2023) that interactive multimedia can solve problems in learning. For the problem to be solved properly, a learning model that supports interactive multimedia is needed, namely the problem-based learning model. Learning that is said to be active is by creating a condition where students can play an active role, while the lecturer acts as a facilitator. In this case learning with Problem Based Learning as one part of CTL (Contextual Teaching and Learning) learning is a learning model chosen to overcome the problems faced by researchers to increase student activity. (Rosdiyanti & Khairunnisah, 2022). Positive perceptions of students towards interactive media stated:

Most respondents stated that the use of interactive media helped them understand digital concepts more clearly. Interactive media provides in-depth visualizations and simulations, which makes learning more interesting and memorable.

The improvement of digital literacy skills shows that participants reported that their digital skills improved, such as the ability to use digital tools, critically understand digital content, and produce digital content. This shows that interactive media not only serves as a teaching tool, but also as a skill development tool. In this study, the material implemented using the problem-based learning model using interactive multimedia to improve student digital literacy is the material on the basic concepts of Indonesian language, which is a course for PGSD students in semester 5, this course is a basic course for students in learning Indonesian language, so students need tools to receive learning that is in accordance with the 21st century, namely interactive digital media, so researchers use interactive multimedia in the basic concepts of Indonesian language to facilitate students in learning, this concept has also been implemented by interactive multimedia-based teaching materials students can understand the material and questions that train skills in Indonesian language learning (Kuswandi & Wedi, 2023).

CONCLUSION

Based on the research that has been carried out by researchers, the use of the interactive multimedia-based Problem Based Learning model is able to improve the digital literacy skills of PGSD students, as evidenced by the test results, namely the pretest and posttest scores of students. Based on the total number of 36 students, in the pretest assessment students got an average score of 67, and the posttest assessment, students got an average score of 88.5, as well as evidenced by the results of the PGSD student questionnaire who filled in a positive response to the use of the problem-based learning model using interactive multimedia. Based on the results of the student response questionnaire indicated that students felt more helped and motivated in the learning process when using the PBL method supported by interactive multimedia. This approach not only improves academic ability, but also encourages active involvement and positive responses from students to the material being studied. Overall, this study confirms that the implementation of interactive multimedia-based PBL is an effective strategy for improving digital literacy. This is important to be applied more widely in higher education, especially in PGSD study programs, to support the development of skills that are relevant to the demands of today's digital.

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