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Enhancing Digital Literacy in Eighth-Grade Students through AI-Integrated ProProfs.com and Differentiated Instruction

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Abstract

Digital literacy is essential for success in the 21st-century education landscape, requiring innovative strategies to address diverse learner needs. This study examines the effectiveness of the Differentiated Instruction (DI) strategy integrated with AI-enabled ProProfs.com in improving eighth-grade students' digital literacy skills. A quasi-experimental design was employed with 60 students divided into an experimental group (30) and a control group (30). Results showed a significant improvement in digital literacy for the experimental group, with an average score increase of 16.7 points ($p < 0.0001$), compared to 3.4 points in the control group ($p = 0.045$). ProProfs.com allowed personalized learning, leading to higher motivation and engagement; 85% of students reported increased motivation, and 78% noted better material comprehension. These findings highlight the effectiveness of AI-integrated platforms in differentiated learning, encouraging educators and policymakers to adopt such approaches to enhance digital literacy and cater to diverse educational needs.

Keywords: *Digital Literacy, Differentiated Instruction, Artificial Intelligence, ProProfs.com*

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INTRODUCTION

The rapid development of digital technology has transformed almost all aspects of life, including education. In the era of the Industrial Revolution 4.0, digital skills are no longer just an added value but a fundamental necessity for every individual, especially students preparing for the workforce and global community. Digital literacy defined as the ability to search, evaluate, use, and create information using digital technology has become a core component of 21st-century competencies.

Globally, digital literacy gaps persist despite increasing access to technology. A 2023 report by the Organisation for Economic Co-operation and Development (OECD) found that 40% of students in member countries lack basic digital problem-solving skills. In Indonesia, the issue is even more pronounced. Data from the Indonesian Ministry of Education 2023 reveals that only 38% of students can critically evaluate digital information, while less than 25% are able to produce meaningful digital content. Furthermore, the Digital Literacy Index 2023 reported that Indonesia scored 3.47 on a 5-point scale, indicating a "moderate" level, with significant disparities between urban and rural areas. This aligns with findings from Khan et al. (2022), which indicate that many students remain passive consumers of digital content, struggling to evaluate the validity of information or develop critical analysis skills.

At Junior High School 1 Wuluhan, Jember Regency, these global and national challenges are reflected in the local context. Many students rely heavily on digital devices for entertainment, such as gaming or social media, rather than academic purposes (Han, 2022; Ramadani, 2024). This creates significant challenges for teachers in leveraging technology to support the learning process. When teachers ask students to use smartphones in class, students often struggle to understand and digest the information presented through these devices. Research shows that students accustomed to using digital devices for gaming are more likely to find it difficult to transition to activities that require deeper understanding and analysis, such as reading educational materials delivered in digital format. This contributes to low academic achievement, often falling below the Minimum Competency Criteria (KKM) (Purwati & Sabilillah, 2024). For instance, a recent internal survey showed that 65% of eighth-grade students could not distinguish credible from non-credible sources in digital texts. This highlights the need for targeted interventions to enhance students' digital literacy.

Junior High School 1 Wuluhan, Jember Regency, as an educational institution, faces similar challenges. Students at this school also struggle to comprehend reading materials presented through digital technology. This situation is a serious concern, given the importance of digital literacy for academic success and the development of 21st-century skills. Therefore, effective solutions are needed to enhance students' digital literacy at this school. Addressing this issue requires innovative strategies that cater to diverse learning needs while leveraging technology effectively. Differentiated Instruction (DI) is one such approach. DI tailors teaching methods and materials to the individual needs, interests, and abilities of each student (Ouyang & Ye, 2023). With this approach, teachers can provide a more personalized and relevant learning experience, allowing students to learn in the ways that suit them best (Solihin et al., 2024). Differentiated Instruction can be applied in the context of digital literacy by offering students various ways to access and understand information. For instance, students who prefer visual learning can be provided with materials in the form of videos or infographics, while those more comfortable with text can receive more in-depth reading assignments. This approach is expected to help students better understand and process digital information.

On the other hand, advances in artificial intelligence (AI) provide a great opportunity for education to overcome these challenges. AI can be used to personalize the learning process, provide feedback tailored to students' individual needs, and monitor their learning progress in real-time (Hooda et al., 2022). Various digital education platforms have integrated AI to support a more effective and efficient teaching-learning process (Pratama et al., 2023). One such platform that can be integrated with AI to support students' digital literacy is ProProfs.com, a learning platform that offers various features such as interactive quizzes, flashcards, and other collaborative learning tools.

To support the Differentiated Instruction strategy, ProProfs.com emerges as an effective tool for creating an interactive and adaptive learning environment. ProProfs.com is an online platform that allows teachers to create quizzes, surveys, and interactive courses tailored to students' needs. With the features offered by ProProfs, teachers can design diverse and engaging learning materials while tracking student progress in real-time (Aristia & Sari, 2024; Daulay & Syahrin, 2023; Pramudita et al., 2023). By utilizing ProProfs.com, teachers at Junior High School 1 Wuluhan can provide a more engaging and relevant learning experience for their students. For example, teachers can create interactive quizzes that test students' understanding of digital reading materials or develop online courses that allow students to learn independently using various types of content.

Digital literacy has become a focal point in the context of modern education, coinciding with the increased use of information and communication technology (ICT) among students. According to Erwin & Mohammed (2022), digital literacy encompasses the skills necessary to search for, evaluate, and effectively use information in the digital world. Alongside this, research by Martínez-Bravo et al. (2022) shows that students with strong digital literacy skills can more easily adapt to technology-based learning. However, challenges arise when many students, despite being familiar with technological devices, struggle to critically digest information.

Differentiated Instruction (DI) has been recognized as an effective approach to addressing diverse learning needs in the classroom. Research by Karst et al., (2022) indicates that DI enables teachers to tailor teaching strategies and materials according to individual students' needs, positively impacting learning outcomes. Additionally, the use of technology such as ProProfs.com in education has been shown to enhance student engagement. Research by Alenezi et al. (2023) emphasizes that integrating digital resources into teaching can encourage students to be more actively involved in their learning.

In addition to utilizing AI technology, the implementation of differentiated learning is also key in improving students' digital literacy. Differentiated learning is a student-centered approach that aims to tailor subject matter and teaching strategies based on each student's needs, interests and abilities. With the application of AI in differentiated learning, teachers can more easily monitor and adjust teaching methods according to each student's digital literacy ability. Higher-ability students can be given more challenging tasks, while students who need more support can be guided more intensively.

Based on this review of previous studies, it is essential to explore how the implementation of DI strategies with the support of digital platforms can effectively enhance students' digital literacy. This research aims to explore the effectiveness of implementing the Differentiated Instruction strategy with the help of ProProfs.com in enhancing the digital literacy of eighth-grade students at Junior High School 1 Wuluhan. Through this research, it is hoped that evidence will be found that a personalized learning approach, when combined with supporting technology, can help improve students' understanding of digital information. This research seeks to fill that gap by exploring how the integration of AI in ProProfs.com, combined with differentiated learning, can help improve students' digital literacy skills. This research also aims to provide guidance for educators in implementing AI technology in the classroom to meet the needs of diverse students.

This study uniquely contributes to existing literature by exploring the integration of AI-powered ProProfs.com within a Differentiated Instruction framework to address digital literacy gaps among eighth-grade students. While prior research has demonstrated the benefits of DI or AI in isolation, this study investigates their combined impact in the Indonesian educational context. By focusing on Junior High School 1 Wuluhan, this research aims to provide practical guidance for educators in designing effective, technology-enhanced learning experiences.

The findings are expected to benefit not only students at Junior High School 1 Wuluhan but also educators and policymakers seeking to bridge digital literacy gaps nationwide. This study contributes to the broader literature on digital literacy and highlights strategies for incorporating technology to support diverse learning needs in Indonesia's educational landscape. Ultimately, enhancing students' digital literacy will bolster their academic success and prepare them for the challenges of a technology-driven future.

METHODS

This study employed a quasi-experimental design to evaluate the effectiveness of the Differentiated Instruction (DI) strategy supported by the ProProfs.com AI-integrated platform in enhancing the digital literacy skills of grade VIII students at Junior High School 1 Wuluhan, Jember Regency. The study population consisted of grade VIII students, with a sample of 30 students from class 8A as the experimental group and 30 students from class 8B as the control group. To ensure diversity in academic ability, participants were randomly selected. The independent variable was the DI strategy using the AI-integrated ProProfs.com platform, while the dependent variable was students' digital literacy skills, assessed through pre-and post-test scores.

The research utilized several instruments, including a digital literacy test to measure students' ability to search, evaluate, and utilize digital information effectively. Questionnaires were used to gather student attitudes toward technology and learning preferences, while observations documented student engagement and interaction during lessons. In-depth interviews with teachers and students provided qualitative insights into the learning process and outcomes.

The research procedure began with preliminary preparations, such as obtaining permission from the school, developing and validating research instruments, and training teachers involved in the study. During the six-week implementation phase, the experimental group participated in sessions twice a week using ProProfs.com, which integrated AI to offer real-time feedback, identify individual weaknesses, and recommend personalized learning materials. In contrast, the control group received conventional instruction without the use of AI or digital tools. Data were collected through pre- and post-tests to assess progress in digital literacy, along with questionnaires to capture students' attitudes, classroom observations to evaluate engagement, and interviews to explore participants' perceptions of the intervention.

Data analysis included a statistical comparison of pre-and post-test results to determine the intervention's impact, supplemented by thematic analysis of qualitative data from questionnaires, observations, and interviews (Erviana et al., 2024). By integrating AI into a differentiated learning

framework, this study sought to provide valuable insights into addressing digital literacy challenges in secondary education, particularly in settings with diverse learning needs.

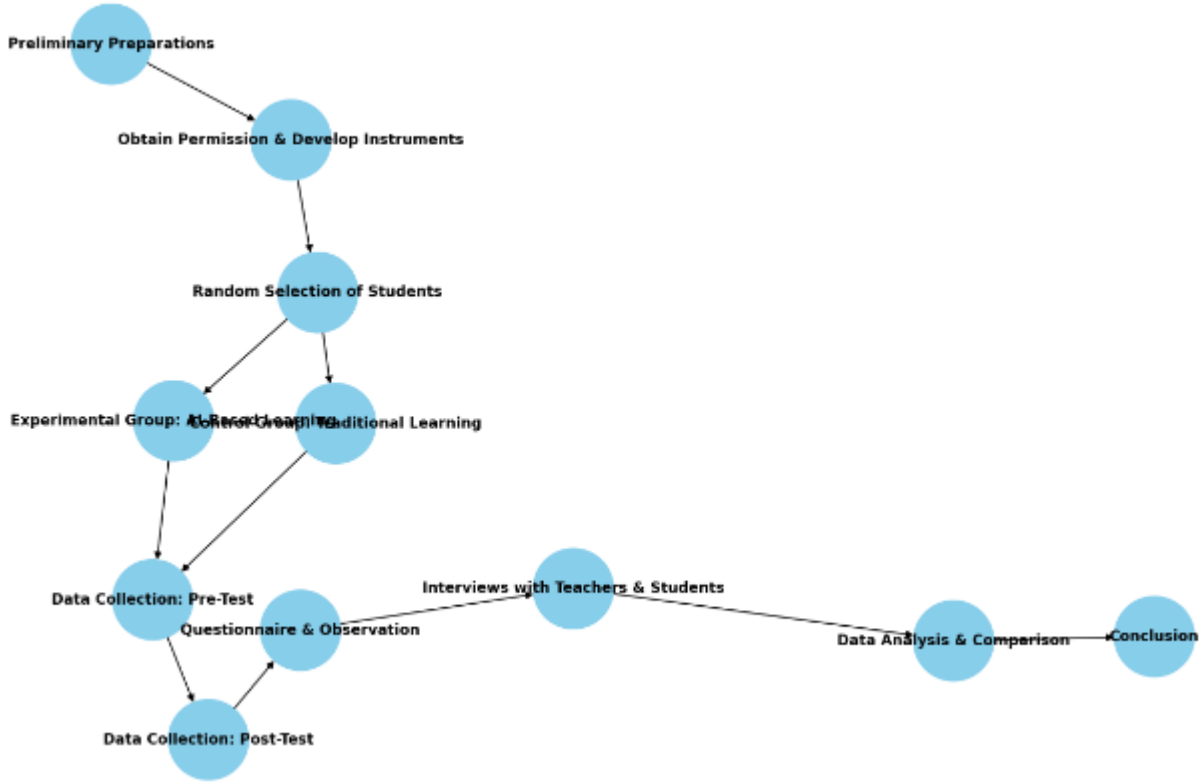

Figure 1: Research Process Flowchart

RESULTS AND DISCUSSION

ProProfs.com Features

The integration of ProProfs.com in the Differentiated Instruction strategy significantly impacted the development of digital literacy skills among eighth-grade students. The features of ProProfs.com, such as interactive quizzes, AI-based feedback, and adaptive learning content, played a pivotal role in improving students' digital literacy.

- **Interactive Quizzes**: The use of interactive quizzes in ProProfs.com was one of the key components in helping students practice and reinforce their digital literacy skills. These quizzes provided immediate opportunities for students to apply what they had learned, particularly in terms of searching for, evaluating, and using digital information. The quizzes were designed to assess both basic and advanced competencies, allowing students to gauge their understanding of digital reading materials, research techniques, and the ability to critically evaluate information. As a result, students were able to identify gaps in their knowledge and address them promptly, which contributed to an increase in their overall digital literacy.
- **Adaptive Learning Content**: ProProfs.com also utilized adaptive learning technology, which adjusted the difficulty and content of lessons based on each student's performance. For example, students with higher levels of digital literacy were offered more challenging tasks. At the same time, those who needed additional support were provided with simpler tasks or supplementary resources to reinforce their understanding. This feature ensured that all students received the appropriate level of challenge, enhancing their engagement and encouraging them to push their limits in mastering digital skills.

Through these features, ProProfs.com was able to create an engaging and effective learning environment that addressed the diverse needs of students. The platform's ability to offer personalized learning paths, immediate feedback, and adaptive content helped significantly enhance the students' digital literacy skills. However, it should be noted that challenges related to varying levels of student engagement and technical issues with the platform were observed, which may have affected the overall outcomes for some students.

Demographic Data Description of Respondents

The research sample consists of 60 eighth-grade students at Junior High School 1 Wuluhan, Jember Regency, divided into the experimental group (30 students) and the control group (30 students). Table 1 shows the demographic data of the respondents.

Table 1. The Demographic Data of The Respondents

Category	Experimental Group (n=30)	Control Group (n=30)
Gender		
- Male	15	16
- Female	15	14
Age (years)	13.2 (±0.5)	13.1 (±0.4)
Average Initial Score	65.4 (±5.2)	64.9 (±5.1)

Digital Literacy Test Results

The graph in Figure 2 compares the average digital literacy test scores for both groups before and after the intervention.

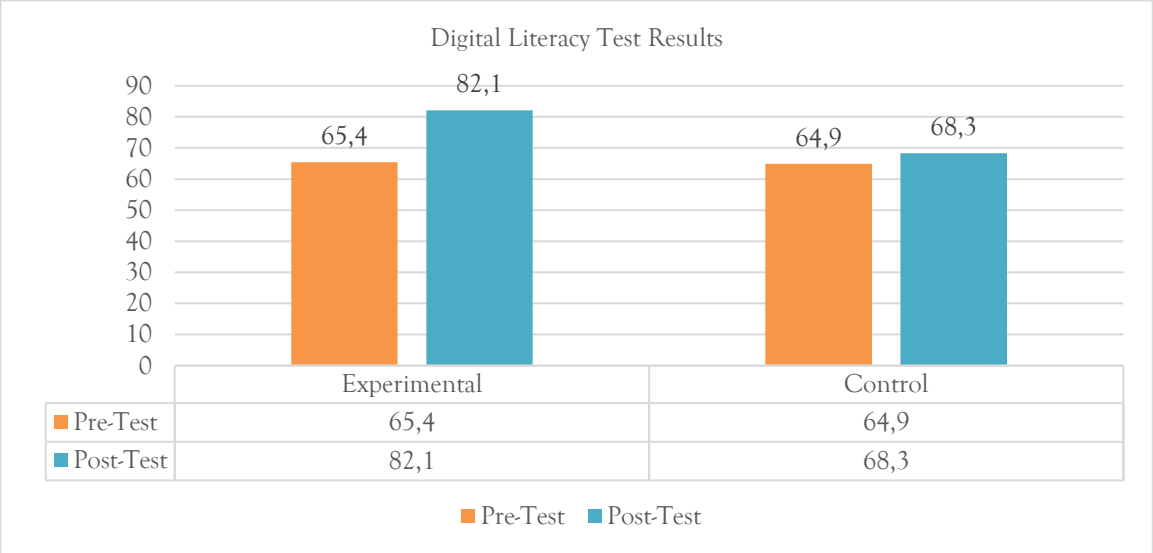

Figure 2: Graph of Digital Literacy Test Results

Digital literacy tests were conducted before and after the intervention to measure student improvement. Table 2 shows the average test scores before (pre-test) and after (post-test) the intervention for both groups.

Table 2. Digital Literacy Test Results

Group	Average Score Before Intervention	Average Score After Intervention	Score Improvement	P-value
Experimental	65.4 (±5.2)	82.1 (±4.8)	16,7	0,0001
Control	64.9 (±5.1)	68.3 (±5.0)	3,4	0,045

Statistical Analysis

Data analysis was conducted using a t-test to assess the significant differences between the experimental and control groups. The analysis results indicate a significant improvement in the experimental group compared to the control group. The Experimental Group showed an average increase of 16.7 points, with a p-value of <0.0001, indicating that implementing Differentiated Learning strategies using ProProfs.com integrated with AI significantly improved students' digital literacy skills. The Control Group experienced an average increase of 3.4 points,

with a p-value of 0.045, indicating that although there was an increase, the impact was not as great as the experimental group.

Feedback from Students and Teachers

After the intervention, interviews and questionnaires were completed by students to gather feedback on their learning experience. The questionnaire results showed that 85% of students in the experimental group felt more motivated and engaged in learning, and 78% of students stated that they understood the material better when using ProProfs.com. Teachers also provided positive feedback, stating that the use of ProProfs.com made it easier for them to adapt learning materials to the needs of diverse students. They noted that students who usually have difficulty learning find it easier to understand the material with the Differentiated Learning approach supported by AI.

Discussion

The results of this research indicate that applying the Differentiated Instruction (DI) strategy with AI-Integrated Proprofs.com significantly improves digital literacy skills among eighth-grade students at Junior High School 1 Wuluhan. The average increase in digital literacy test scores for students in the experimental group was 16.7 points, while the control group experienced only a 3.4-point increase. This demonstrates that students taught using the DI method are more capable of understanding and processing information from digital reading materials than those who follow conventional teaching methods. The significant improvement in the experimental group emphasizes the potential of using AI-integrated platforms to enhance digital literacy in the classroom.

The results of this study clearly demonstrate the positive impact of using the Differentiated Instruction strategy with ProProfs.com integrated with AI on enhancing the digital literacy skills of eighth-grade students at Junior High School 1 Wuluhan. The demographic data of both groups—experimental and control—show that they are comparable in gender distribution and average initial scores, ensuring a fair comparison. This demographic balance minimizes potential biases that could affect the results and strengthens the validity of the research findings (Markoulidakis et al., 2023). The study avoids skewing results based on pre-existing differences by ensuring these comparable characteristics.

The experimental group, exposed to the Differentiated Instruction strategy via ProProfs.com, showed a remarkable improvement in digital literacy skills, with an average score increase of 16.7 points. The statistical analysis ($p < 0.0001$) confirms this improvement is significant. This suggests that AI-Integrated Proprofs.com, as a digital learning tool, effectively supports diverse student needs and enhances their ability to engage with digital content. The integration of AI in ProProfs.com allows for a personalized approach to learning, which seems to be a crucial factor in the improvement of digital literacy among students. Differentiated Instruction, which tailors teaching methods to students' varying abilities and learning preferences, seems to be a powerful approach to improving digital literacy (Krishan & Al-rsa'i, 2023). In contrast, the control group, which followed traditional teaching methods, showed only a modest improvement (3.4 points) in their digital literacy skills. The statistical significance of this improvement ($p = 0.045$) suggests that while traditional methods can result in some gains, they are far less effective compared to the intervention used in the experimental group. This reinforces the idea that relying solely on conventional teaching strategies may not be enough to equip students with essential digital skills, especially in today's technology-driven world (Carabregu-Vokshi et al., 2024). This finding highlights the gap in effectiveness between traditional and technology-enhanced teaching methods.

The use of ProProfs.com integrated with AI, a platform that allows teachers to create tailored learning experiences, seems to have played a crucial role in enhancing students' motivation and engagement. The personalized learning experience offered by ProProfs.com helps students stay engaged, as it provides real-time feedback and adapts to their progress. The feedback gathered from students supports this, with 85% of the experimental group reporting higher levels of motivation and engagement, and 78% indicating that the platform helped them better understand the material. The high engagement levels reported by students demonstrate the platform's effectiveness in maintaining student interest and facilitating a deeper understanding of digital literacy content. The ability of ProProfs.com to cater to different learning styles appears to be a key factor in improving students' digital literacy, as it encourages active learning and personalized engagement with content (Young, 2024).

Teachers' positive feedback further reinforces the effectiveness of AI-Integrated ProProfs.com in the classroom. They noted that the platform allowed them to tailor instruction to meet the diverse needs of their students. This flexibility helps teachers better address the learning gaps of individual students, providing them with the resources they need to succeed. This ability to customize learning is particularly valuable in mixed-ability classrooms, where students may have different learning paces and comprehension levels (Malisiova et al., 2023). By using technology to differentiate instruction, teachers can ensure that all students, including those who typically struggle, are given the opportunity to succeed.

One factor contributing to these positive results is ProProfs.com's ability to provide diverse and interactive materials. Students can engage in quizzes, videos, and learning modules tailored to their learning styles. These varied learning materials enhance student engagement and cater to different learning preferences, making learning more effective and enjoyable. According to Grecu (2023), differentiated Instruction is an approach that recognizes each student's unique learning needs, requiring different methods to access information. ProProfs.com integrated with AI enables teachers to customize materials and teaching methods according to the individual needs of students, which contributes to better outcomes (Amar, 2023).

This research aligns with previous studies that indicate the application of DI in education can enhance student learning outcomes. For instance, Zen & Ariani (2022) found that using DI methods in the classroom can increase student engagement and academic performance. Furthermore, Goss (2022) demonstrated that approaches focused on individual student needs significantly influence learning outcomes. In the context of digital literacy, research by Le et al. (2022) shows that students given access to digital resources and technology-based learning exhibit improvements in their digital literacy skills. This supports the findings of this study, which indicate that the use of ProProfs.com as a digital learning tool positively contributes to enhancing students' digital literacy.

The implications of these findings are crucial for educational practices at Junior High School 1 Wuluhan and other schools facing similar issues. First, it is essential for teachers to consider the use of technology in the learning process. By integrating technology, especially AI-based platforms like ProProfs.com, teachers can create a more dynamic and engaging learning experience that better supports students' development of digital literacy. This aligns with the needs of students who are increasingly accustomed to technology in their daily lives (Palalas & Doran, 2023). Second, teachers need training in implementing DI strategies. Professional development for teachers can ensure they understand how to utilize AI tools effectively and how to customize their teaching methods to meet students' diverse needs. Such training will help them understand how to identify students' learning needs and design appropriate learning materials. This study demonstrates that students with different learning needs can benefit from tailored approaches, making it vital for teachers to develop skills to implement these strategies effectively (Muñoz et al., 2022). Third, the development of an inclusive curriculum should be considered. A curriculum that allows for variations in teaching methods and assessments will better meet the diverse needs of students. By integrating technology into the curriculum, schools can facilitate improved learning for all students (Martinez, 2022). Curriculum development should prioritize inclusivity, ensuring that all students can benefit from personalized learning experiences facilitated by technology.

This study successfully demonstrates that applying the Differentiated Instruction strategy supported by ProProfs.com significantly enhances the digital literacy skills of eighth-grade students at Junior High School 1 Wuluhan. The success of this study provides evidence for the positive impact of technology integration in the classroom. This improvement is evident not only from test results but also from the positive feedback provided by both students and teachers. Therefore, this research contributes significantly to educational practices, especially in today's digital era, where digital literacy is increasingly essential for students. Schools should consider integrating technology into learning to enhance students' digital literacy skills and train teachers to apply effective teaching strategies. By implementing AI-driven platforms like ProProfs.com, schools can bridge the digital literacy gap and prepare students for success in a technology-driven world.

CONCLUSION

This study demonstrates that implementing the Differentiated Instruction strategy supported by AI-integrated ProProfs.com significantly enhances the digital literacy skills of eighth-grade students. The increase in average digital literacy test scores and the positive feedback from both students and teachers highlight the effectiveness of this method in addressing diverse learning needs. It is recommended that policymakers

prioritize technology integration in education and provide training for teachers to implement DI strategies effectively. Future research should explore the long-term impact of AI in education and test with larger, more diverse samples to assess broader applicability.

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REFERENCES

Alenezi, M., Wardat, S., & Akour, M. (2023). The need of integrating digital education in higher education: Challenges and opportunities. *Sustainability*, *15*(6), 4782. https://doi.org/10.3390/su15064782

Amar, F. S. (2023). *The Effectiveness Of Scramble Game Online In Teaching Vocabulary Mastery At The Second Semester At The Eighth Grade Of Smpn 1 Sekampung Udik In The Academic Year Of 2021/2022*. UIN Raden Intan Lampung.

Aristia, M., & Sari, R. (2024). Development of B1 Level Listening Learning Media Using the Proprofs Platform. *Asian Journal of Applied Education (AJAE)*, *3*(2), 157–166. https://doi.org/10.55927/ajae.v3i2.8790

Carabregu-Vokshi, M., Ogruk-Maz, G., Yildirim, S., Dedaj, B., & Zeqiri, A. (2024). 21st century digital skills of higher education students during Covid-19—is it possible to enhance digital skills of higher education students through E-Learning? *Education and Information Technologies*, *29*(1), 103–137. https://doi.org/10.1007/s10639-023-12232-3

Daulay, T. F., & Syahrin, E. (2023). Développement Du Média Évaluation D'apprentissage Du Français En Utilisant L'application "Proprofs" À Sman 1 Batang Kuis. *Indonesian Journal of Language, Literature, and Education Language, Literature*, *1*(1), 107–114.

Erviana, A., Mahanal, S., & Setiawan, D. (2024). Digital literacy practice in mobile learning based on PBL in human's heredity to enhance students' cognitive learning outcomes. *AIP Conference Proceedings*, *3106*(1). https://dx.doi.org/10.1063/5.0215154

Erwin, K., & Mohammed, S. (2022). Digital Literacy Skills Instruction and Increased Skills Proficiency. *International Journal of Technology in Education and Science*, *6*(2), 323–332. https://doi.org/10.46328/ijtes.364

Goss, H. (2022). Student learning outcomes assessment in higher education and in academic libraries: A review of the literature. *The Journal of Academic Librarianship*, *48*(2), 102485. https://doi.org/10.1016/j.acalib.2021.102485

Grecu, Y. V. (2023). Differentiated instruction: Curriculum and resources provide a roadmap to help English teachers meet students' needs. *Teaching and Teacher Education*, *125*, 104064. https://doi.org/10.1016/j.tate.2023.104064

Han, S. (2022). Impact of smartphones on students: How age at first use and duration of usage affect learning and academic progress. *Technology in Society*, *70*, 102002. https://doi.org/10.1016/j.techsoc.2022.102002

Hooda, M., Rana, C., Dahiya, O., Rizwan, A., & Hossain, M. S. (2022). Artificial intelligence for assessment and feedback to enhance student success in higher education. *Mathematical Problems in Engineering*, *2022*(1), 5215722. https://doi.org/10.1155/2022/5215722

Karst, K., Bonefeld, M., Dotzel, S., Fehringer, B. C. O. F., & Steinwascher, M. (2022). Data-based differentiated instruction: The impact of standardized assessment and aligned teaching material on students' reading comprehension. *Learning and instruction*, *79*, 101597. https://doi.org/10.1016/j.learninstruc.2022.101597

Khan, N., Sarwar, A., Chen, T. B., & Khan, S. (2022). Connecting digital literacy in higher education to the 21st century workforce. *Knowledge Management & E-Learning*, *14*(1), 46–61. https://doi.org/10.34105/j.kmel.2022.14.004

Krishan, I. Q., & Al-rsa'i, M. S. (2023). The Effect of Technology-Oriented Differentiated Instruction on

Motivation to learn Science. *International Journal of Instruction*, *16*(1). https://doi.org/10.29333/iji.2023.16153a

Le, B., Lawrie, G. A., & Wang, J. T. H. (2022). Student self-perception on digital literacy in STEM blended learning environments. *Journal of Science Education and Technology*, *31*(3), 303–321. https://doi.org/10.1007/s10956-022-09956-1

Malisiova, A., Kougioumtzis, G. A., Tsitsas, G., Koundourou, C., & Mitraras, A. (2023). Implementing inclusive education in mixed-ability classrooms by employing differentiated instruction. In *Perspectives of cognitive, psychosocial, and learning difficulties from childhood to adulthood: Practical counseling strategies* (hal. 155–178). IGI Global.

Markoulidakis, A., Taiyari, K., Holmans, P., Pallmann, P., Busse, M., Godley, M. D., & Griffin, B. A. (2023). A tutorial comparing different covariate balancing methods with an application evaluating the causal effects of substance use treatment programs for adolescents. *Health Services and Outcomes Research Methodology*, *23*(2), 115–148. https://doi.org/10.1007/s10742-022-00280-0

Martínez-Bravo, M. C., Sádaba Chalezquer, C., & Serrano-Puche, J. (2022). Dimensions of digital literacy in the 21st century competency frameworks. *Sustainability*, *14*(3), 1867. https://doi.org/10.3390/su14031867

Martinez, C. (2022). Developing 21st-century teaching skills: A case study of teaching and learning through project-based curriculum. *Cogent Education*, *9*(1), 2024936. ttps://doi.org/10.1080/2331186X.2021.2024936

Muñoz, J. L. R., Ojeda, F. M., Jurado, D. L. A., Peña, P. F. P., Carranza, C. P. M., Berríos, H. Q., Molina, S. U., Farfan, A. R. M., Arias-Gonzáles, J. L., & Vasquez-Pauca, M. J. (2022). Systematic review of adaptive learning technology for learning in higher education. *Eurasian Journal of Educational Research*, *98*(98), 221–233. https://10.0.57.97/ejer.2022.98.014

Ouyang, J., & Ye, N. (2023). Differentiated Instruction: Meeting the Needs of All Learners. *Curriculum and Teaching Methodology*, *6*(11), 57–61. https://doi.org/10.23977/curtm.2023.061111

Palalas, A., & Doran, M. (2023). Digital Wellness Framework for Online Learning. *Canadian Journal of Learning and Technology*, *49*(3), 1–25. https://doi.org/10.21432/cjlt28581

Pramudita, R. F., Rahmanita, M., Wardani, P. A., Farhan, M., & Binarkaheni, S. (2023). Students' Perception in Using ProProfs Online Quizzes as an Assessment Tool in English Classroom. *Journal of Language, Communication, and Tourism*, *2*(1), 29–37. https://doi.org/10.25047/jlct.v2i1.4495

Pratama, M. P., Sampelolo, R., & Lura, H. (2023). Revolutionizing education: harnessing the power of artificial intelligence for personalized learning. *Klasikal: Journal of education, language teaching and science*, *5*(2), 350–357. https://doi.org/10.52208/klasikal.v5i2.877

Purwati, P. D., & Sabilillah, N. S. (2024). Development of E-Comic Media Assisted by Class Minimum Competency Assessment (AKM) for Enhancing Competency in Elaborating Fairy Tale Messages among Lower Grade Students. *KEMBARA: Jurnal Keilmuan Bahasa, Sastra, dan Pengajarannya*, *10*(1), 227–244. https://doi.org/10.22219/kembara.v10i1.30847

Ramadani, R. (2024). The impact of technology use on young people: a case study of social media and internet usage. *Asian Journal of Research in Computer Science*, *17*(8), 13–23. https://doi.org/10.9734/ajrcos/2024/v17i7486

Solihin, A., Mariana, N., Ledger, S., Fiscetti, J., & Rappa, N. A. (2024). Responses and Challenges of Indonesian Prospective Elementary Teachers Interacting with Australian Avatar Students. *Educative: Jurnal Ilmiah Pendidikan*, *2*(2), 106–114. https://doi.org/10.70437/educative.v2i2.474

Young, C. J. (2024). *The Lived Experiences of Elementary Teachers and Their Relationships to Their Principals: Evaluations and Reviews, Professional Development and Mentorship*. Keiser University.

Zen, Z., & Ariani, F. (2022). Academic achievement: the effect of project-based online learning method and student engagement. *Heliyon*, *8*(11). https://doi.org/10.1016/j.heliyon.2022.e11509