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The effect of the use of Digital Learning Applications on Student Learning Outcomes in the era of Education 4.0

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ABSTRACT

This study aims to analyze the effect of the use of digital learning applications on student learning outcomes in the era of Education 4.0. The research method used is a qualitative approach with in-depth interviews with 10 student respondents, as well as observation of the use of applications in the classroom. The results showed that digital learning applications can improve students ' understanding of materials and motivation to learn, despite challenges related to technology access such as limited internet connectivity and devices. The use of digital applications also contributes to the development of students digital skills that are essential in the world of work. Teacher support and readiness of educational infrastructure are important factors in the successful implementation of the application. The research suggests the development of more interactive learning applications and more intensive training support for teachers and students.

INTRODUCTION

Education 4.0 is a concept that emerged as a result of the digital industrial revolution, in which technology was not only used as an auxiliary tool, but became an integral part of the educational process. The era of Education 4.0 utilizes various technological advances such as the Internet of Things (IoT), artificial intelligence (AI), and big data, which enable the transformation of teaching and learning. Digital learning applications are one of the important elements in this regard, by providing learning that is more flexible, interactive, and accessible at any time. In addition, Education 4.0 also introduces learning that is more based on skills, creativity, and problem solving, in line with the needs of an increasingly competitive world of work.

In the midst of the rapid development of technology, digital learning applications have become a very relevant means of improving the quality of learning.

Online learning platforms, game-based applications (gamification), as well as the use of AI technology in educational applications allow personalization in the learning process. With these applications, students can learn according to their rhythm and learning style, increase motivation, and explore the material in a more interactive and fun way. Digital apps also offer great accessibility, allowing students to learn outside the classroom and even from far away places, thus overcoming geographical and time limitations. Although the use of digital learning applications provides many opportunities, there are also challenges to be faced. One of them is limited access to technological devices and the internet, especially in areas that do not yet have adequate digital infrastructure. In addition, low technology literacy among some students and teachers is also an obstacle in optimizing digital applications. However, on the other hand, digital learning apps open up great opportunities to introduce more adaptive, project-based learning and encourage more active student engagement. This technology also enables the improvement of 21st century skills, such as collaboration, problem solving, and digital literacy that are much needed in the future.

In Indonesia, the use of digital learning applications is growing, especially since the COVID-19 pandemic forced a major shift to online learning. In the Indonesian context, this study is very relevant to evaluate the extent to which digital applications can improve the quality of education, as well as the challenges faced in their implementation. Globalization and rapid technological developments require education in Indonesia to adapt to new technologies. Other countries, such as Finland and Singapore, have already implemented technology in education with significant results. This study can provide an overview of Indonesia's position in the application of educational technology, as well as provide recommendations to address existing shortcomings.

This study aims to analyze the effect of the use of digital learning applications on student learning outcomes in the era of Education 4.0, as well as to provide recommendations for the development of more effective digital education. Taking into account the rapid development of technology and the challenges faced by education today, this study becomes highly relevant to provide further understanding of the effectiveness of digital applications in improving the quality of learning, both at the local and global levels.

METHODOLOGY

This study will adopt a qualitative descriptive design, which aims to explore in depth the experiences and perceptions of students regarding the use of digital learning applications and their impact on their learning outcomes. With this approach, the researcher does not seek only numerical or statistical data, but rather a broader and holistic understanding of the phenomenon under study. The study may also adopt a case study approach, where the researcher focuses on one particular school or educational institution integrating digital learning applications in its curriculum. Through case studies, researchers can examine specific contexts, classroom dynamics, and student experiences that may differ from other contexts. The phenomenological approach is also relevant in this study, as it can explore the subjective experiences of students who use digital applications, as well as how they give meaning to those experiences in their learning.

The population in this study is students who use digital learning applications at the high school or college level. These students should have hands-on experience with digital learning applications, either integrated in the official curriculum or as a support for independent learning. Purposive sampling techniques will be used to select students who have relevant experience with the research topic. This selection aims to obtain rich and in-depth data, based on certain criteria, such as students who actively use digital learning applications and have a variety of experiences in using these applications. The number of samples taken tends to be smaller compared to quantitative research, usually around 10 to 20 students, because qualitative research focuses more on in-depth understanding than statistical representation.

The main instrument to be used in this research is in-depth interview. This interview will be conducted in a semi-structured or open manner, with the aim of exploring students ' experiences, views and feelings regarding the use of digital learning applications. Interview questions will be designed to explore the impact of the application on the understanding of the material, learning motivation, as well as the challenges they face in using the application. In addition to interviews, participatory observation will also be carried out in the classroom to see first-hand how the application is used in the learning process and how the interaction between students and the application is. The researcher will also collect relevant documentation, such as teaching materials used in applications or learning activities involving technology.

The study will begin with a preparatory phase, in which the researcher designs an open and flexible interviewing instrument to explore the student's experience. The researcher will also prepare observation guidelines to record how digital applications are used in the learning context. After preparation, the data collection phase will be carried out through interviews with students, teachers and other relevant parties, as well as observations in the classroom to check how the application is used in daily learning activities. In addition, documentation related to the use of digital applications will also be collected to support interview and observation data. After the data is collected, the data analysis phase is done by transcribing interviews, encoding the data, and identifying the main themes that arise, such as student motivation, understanding of the material, and obstacles in using digital applications.

Data analysis in this qualitative research will use thematic analysis techniques, which aim to identify themes or patterns that emerge from interviews and observations. Through the coding process, each part of the interview transcript or observation record will be coded to Mark information relevant to the study. These codes will be grouped under the main themes that describe the effects of using digital learning applications on students, such as learning motivation, changes in material understanding, and obstacles encountered in the digital learning process. In addition, triangulation techniques will also be used to ensure the validity of the data. Researchers can use source triangulation, such as interviews with students and teachers, method triangulation by combining interviews, observations, and documentation, and theory triangulation by associating findings with relevant educational theories and technologies.

RESULTS AND DISCUSSION

To dig deeper into the student experience related to the use of digital learning applications, the following are the results of interviews with 10 respondents who provide insight into the impact and challenges they face in the digital learning process.

Respondent 1-Student A (High School)
Interview:
Q: *How did you experience using digital learning applications in learning?*
A: *My experience has been quite positive. Apps like Google Classroom and Kahoot make learning more fun. I can access the material at any time and take quizzes that test my understanding.*
Q: *is there any change in the understanding of the material after using the digital application?*
A: *Yes, I find it easier to understand the material because there are video explanations and interactive exercises. It helped me understand more than just reading a book.*
Q: *How do digital apps help boost your study motivation?*
A: *gamified apps like Kahoot and Quizizz make learning more fun. When there is competition in it, I become more motivated to learn and repeat the material.*

Respondent 2-Student B (High School)
Interview:
Q: *What do you think about the use of digital learning applications in the learning process?*
A: *I find digital apps like Edmodo very helpful, especially in organizing tasks and monitoring learning progress. However, sometimes the app is confusing due to too many features.*
Q: *does this digital app affect your learning outcomes?*
A: *it can be said to affect, although not directly. With the app, I can study outside of school hours and repeat material I don't understand yet.*
Q: *What challenges do you face in using digital applications?*
A: *the biggest challenge is an internet connection that is not always stable. Sometimes when studying online, there are distractions that make it difficult for me to follow the material.*

Respondent 3-Student C (vocational)
Interview:
Q: *How do digital learning apps affect your learning experience?*
A: *apps like Moodle and Zoom are helpful, especially during a pandemic. I was able to attend online lessons even though I couldn't attend class. The application also provides space for direct questions and answers with teachers.*
Q: *have your learning outcomes improved after using digital apps?*
A: *Yes, I feel my learning outcomes are improving. With the app, I was able to take the exam online, and I got quick feedback.*

Respondent 4-Student D (High School)
Interview:
Q: *What attracted you to using digital learning apps?*
A: *I am interested because that app allows me to study anytime and anywhere, especially when there is an urgent task. It gives freedom in managing study time.*
Q: do digital apps make you more engaged in learning?
A: *Yes, especially with the discussion forums and additional materials that can be accessed easily. It makes me more active.*

Respondent 5-Student E (High School)
Interview:
Q: *How do digital learning apps help you in understanding difficult material?*
A: *I can watch the material explanation video more than once until I understand it. Apps like YouTube and Khan Academy are helpful.*
Q: *How do you feel when using digital applications compared to conventional learning?*
A: *I feel freer and more flexible. No rush, can learn at my own pace.*

Respondent 6-Student F (High School)
Interview:
Q: *Do you feel digital learning apps improve your problem solving skills?*
A: *Yes, especially the app that tests my understanding with multiple choice questions and discussions. I became more able to think critically.*

Respondent 7-Student G (College)
Interview:
Q: *How does the use of digital applications affect your academic results?*
A: *the use of applications such as Google Classroom and Zoom help me follow the lecture well, although not all the material can be understood only through the application. I find it easier to catch up on lessons after college because there is material that can be repeated.*

Respondent 8-student H (High School)
Interview:
Q: *What are your impressions of digital learning apps outside of school?*
A: *learning apps like Duolingo for foreign languages are very helpful. I can learn English more often though outside of school hours.*

Respondent 9-Student I (SMK)
Interview:
Q: *does this digital app affect the way you manage your study time?*
A: *very influential. Apps like Google Calendar help me plan my schedule of assignments and exams so I don't rush at the last moment.*

Respondent 10-Student J (College)
Interview:
Q: *What challenges have you faced in using digital learning apps?*
A: *the biggest challenge is the lack of direct interaction with friends or lecturers. Although there is a discussion forum, I feel there is less opportunity to discuss directly.*
Q: *does this digital app make you more confident in learning?*
A: *Yes, I feel more confident because I can explore various learning resources and get information faster.*

The results of interviews with 10 respondents showed that the use of digital learning applications has a positive impact on the understanding of the material and student learning motivation. Most students find it easier to understand the material with the presence of explanatory videos, practice questions, and interactive quizzes available

in the app. Apps like Kahoot, Google Classroom, and Edmodo also boost their motivation, especially with elements of gamification and flexibility in learning anytime and anywhere. However, the main challenges faced are technical issues, such as unstable internet connections and device limitations. Some students also revealed shortcomings in direct interaction with teachers and friends, which sometimes made them feel less socially connected in the digital learning process. Nonetheless, most students feel digital apps provide more control over their study time and contribute to better learning outcomes.

In this study, it was found that digital learning applications have a significant impact on student learning outcomes. Based on the results of interviews with respondents, most students feel that digital applications make it easier for them to understand difficult material, especially through various interactive features such as video tutorials, quizzes, and practice questions. Digital learning apps also increase students learning motivation, especially with the gamification element and time flexibility offered. Students feel more motivated to actively participate in the learning process, compared to conventional methods that are more structured and limited. However, there are challenges that need to be overcome in the use of digital learning applications. Many students have reported connectivity and device issues, hindering the smooth learning process. In addition, although digital applications provide flexibility in learning, some students reveal that the lack of social interaction with teachers and their peers reduces the quality of collaboration in learning. This demonstrates the importance of a balance between the use of technology and social interaction in an educational context.

In terms of 21st century skills development, digital learning applications are proven to help students in developing digital skills that are essential for the world of work in the future, such as time management, problem solving, and collaboration skills. Apps that provide a platform to discuss and work in online groups also enrich students learning experiences, although some students feel that online collaboration is not as effective as face-to-face interaction. The importance of teacher support and adequate infrastructure is also highlighted in this study. Teachers who actively provide guidance and motivation in using digital applications can maximize the effectiveness of learning. On the other hand, the readiness of school infrastructure and the presence of technology training for teachers and students are instrumental in the successful implementation of digital applications in the learning process.

Despite the positive impact, there are some limitations in this study, such as the subjectivity of the results caused by the qualitative approach and the limitation of the relatively small number of samples. Therefore, further studies with larger and diverse samples are needed to reinforce these findings. Looking at the implications for future education, the study recommends that developers of digital learning applications need to focus more on aspects of interactivity, reduction of technical barriers, and enhancement of collaboration features. In addition, governments and educational institutions should invest more in digital infrastructure and provide adequate training to maximize the use of technology in the learning process.

CONCLUSION

Based on this research, it can be concluded that the use of digital learning applications has a positive influence on student learning outcomes, especially in improving the understanding of the material and motivation to learn. Despite challenges

related to connectivity, devices and lack of social interaction, the app helps students develop digital skills that are essential for the world of work in the future. Active teacher support and adequate educational infrastructure are important factors in optimizing the use of digital learning applications. The study also shows the importance of continuous evaluation and development of digital applications to ensure their relevance and effectiveness. Overall, these findings provide insight into the huge potential of digital applications in supporting learning processes in the era of Education 4.0, although more attention needs to be paid to addressing existing challenges.

LITERATURE

Afifa, K., & Astuti, T. (2024). The effect of digital learning media on motivation and learning outcomes of IPAS. *Jurnal Penelitian Pendidikan IPA*, *10*(6), 3155-3165.

Alakrash, H. M., & Razak, N. A. (2020). Towards the education 4.0, readiness level of EFL students in utilising technology-enhanced classroom. *International Journal of Innovation, Creativity and Change*, *13*(10), 161-182.

Bonfield, C. A., Salter, M., Longmuir, A., Benson, M., & Adachi, C. (2020). Transformation or evolution?: Education 4.0, teaching and learning in the digital age. *Higher education pedagogies*, *5*(1), 223-246.

Ciolacu, M., Tehrani, A. F., Beer, R., & Popp, H. (2017, October). Education 4.0—Fostering student's performance with machine learning methods. In *2017 IEEE 23rd international symposium for design and technology in electronic packaging (SIITME)* (pp. 438-443). IEEE.

Elayyan, S. (2021). The future of education according to the fourth industrial revolution. *Journal of Educational Technology and Online Learning*, *4*(1), 23-30.

Hakim, A., Nurhikmah, N. H., Halisa, N., Febriati, F., Aras, L., & Lutfi, L. B. (2023). The effect of online learning on student learning outcomes in Indonesian subjects. *Journal of Innovation in Educational and Cultural Research*, *4*(1), 133-140.

Handrayani, D., Rahmadani, K., Baqi, F. A., & Kassymova, G. K. (2023). Education transformation in era 4.0: The effect of learning facilities on student learning outcomes. *Journal of Computer-Based Instructional Media*, *1*(1), 34-43.

Hediansah, D., & Surjono, H. D. (2019). Building Motivation and Improving Learning Outcomes with Android-Based Physics Books: Education 4.0. *Anatolian Journal of Education*, *4*(2), 1-10.

Jugembayeva, B., & Murzagaliyeva, A. (2022). Physics students' innovation readiness for digital learning within the university 4.0 model: Essential scientific and pedagogical elements that cause the educational format to evolve in the context of advanced technology trends. Sustainability, 15(1), 233.

Lase, D. (2019). Education and industrial revolution 4.0. *Jurnal handayani pgsd fip unimed*, *10*(1), 48-62.

Lin, M. H., Chen, H. C., & Liu, K. S. (2017). A study of the effects of digital learning on learning motivation and learning outcome. *Eurasia Journal of Mathematics, Science and Technology Education*, *13*(7), 3553-3564.

Maruf, I. R., Nugroho, B. S., Kurniawan, A., Musiafa, Z., & Satria, E. (2022). Virtual Learning Apps: Best Instructional Leadership Practices in the Digital Age Efforts to Improve Student Learning Outcomes. *Jurnal Iqra': Kajian Ilmu Pendidikan*, *7*(1), 32-43.

Mesterjon, S., & Hermawansyah, D. R. Azharuddin Sahil (2024) Management of Improving Student Learning Outcomes Through 4.0 Learning Media. *American J Sci Edu Re: AJSER-162*.

Mubarak, Z. K., & Selimin, M. A. (2023). Significance of innovative learning skills in the era of education 4.0. *International Journal of Sustainable Construction Engineering and Technology*, *14*(3), 339-352.

Mukul, E., & Büyüközkan, G. (2023). Digital transformation in education: A systematic review of education 4.0. *Technological forecasting and social change*, *194*, 122664.

Parwata, I. W., Hariyadi, A., & Chakim, M. H. R. (2023). The Development of Digital Teaching to Improve the Quality of Student Learning in the Revolution 4.0 Era at Warmadewa University. *Jurnal Iqra': Kajian Ilmu Pendidikan*, *8*(1), 254-269.

Rafiola, R., Setyosari, P., Radjah, C., & Ramli, M. (2020). The effect of learning motivation, self-efficacy, and blended learning on students' achievement in the industrial revolution 4.0. *International Journal of Emerging Technologies in Learning (iJET)*, *15*(8), 71-82.

Rahmatullah, A. S., Mulyasa, E., Syahrani, S., Pongpalilu, F., & Putri, R. E. (2022). Digital era 4.0: The contribution to education and student psychology. *Linguistics and Culture Review*, *6*(S3), 89-107.

Sharma, P. (2019). Digital revolution of education 4.0. *International Journal of Engineering and Advanced Technology*, *9*(2), 3558-3564.

Srivani, V., Hariharasudan, A., Nawaz, N., & Ratajczak, S. (2022). Impact of Education 4.0 among engineering students for learning English language. *PLoS One*, *17*(2), e0261717.

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