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Transforming Education Quality in the Digital Era: Challenges and Opportunities

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Abstract

The digital era has brought significant changes to the world of education, opening up new opportunities and presenting challenges for improving the quality of education. This transformation is characterized by the application of information and communication technology in the teaching and learning process, which overhauls traditional learning methods towards a more interactive, flexible and connected approach. This research aims to examine the impact of digital technology on the quality of education and explore the challenges and opportunities that arise in its application. The methodology used is literature study and secondary data analysis from various related studies. The research results show that digital technology has the potential to increase access, efficiency and effectiveness of learning, but also raises challenges in terms of the digital divide, curriculum adaptation and digital skills development for teaching staff and students. Collaboration is needed between the government, educational institutions and related parties to optimize the benefits of digital technology and overcome emerging challenges, thereby creating an inclusive, adaptive and high-quality education system.

Keywords: *Transformation, Quality Of Education, Global Era*

Abstrak

Era digital membawa perubahan signifikan dalam dunia pendidikan, membuka peluang baru dan menghadirkan tantangan bagi peningkatan kualitas pendidikan. Transformasi ini ditandai oleh adopsi teknologi informasi dan komunikasi dalam proses belajar-mengajar, yang merombak metode pembelajaran tradisional menuju pendekatan yang lebih interaktif, fleksibel, dan terhubung. Penelitian ini bertujuan untuk mengkaji dampak teknologi digital terhadap kualitas pendidikan serta mengeksplorasi tantangan dan peluang yang muncul dalam penerapannya. Metodologi yang digunakan adalah studi literatur dan analisis data sekunder dari berbagai penelitian terkait. Hasil penelitian menunjukkan bahwa teknologi digital berpotensi meningkatkan akses, efisiensi, dan efektivitas pembelajaran, namun juga menimbulkan tantangan dalam hal kesenjangan digital, adaptasi kurikulum, dan pengembangan keterampilan digital bagi tenaga pengajar dan peserta didik. Diperlukan kolaborasi antara pemerintah, institusi pendidikan, dan pihak terkait untuk mengoptimalkan manfaat teknologi digital serta mengatasi tantangan yang muncul, sehingga tercipta sistem pendidikan yang inklusif, adaptif, dan berkualitas tinggi.

Kata Kunci: *Transformasi, Kualitas Pendidikan, Era Global*

Introduction

Transforming the quality of education in the digital era has become a crucial issue, considering the rapid development of technology and its significant influence on the education system. The use of digital technology, such as online learning platforms, educational software, and virtual classes, has increased drastically especially after the COVID-19 pandemic, which has forced many educational institutions to adapt to new methods. However, technology adoption does not always run smoothly. Unequal access to digital infrastructure, especially in remote areas, hinders educational equality. A survey from (John, 2020) shows that around 50% of students in developing countries do not have adequate internet access to support online learning.[1] In Indonesia, for example, problems such as a lack of digital skills among educators and weak internet connections add to the complexity of implementing technology in learning spaces.

Several previous studies have shown that digital technology can improve motivation and learning outcomes if integrated with appropriate teaching strategies. For example, research conducted (Heilporn et al., 2021), (Almusaed et al., 2023) emphasized that blended learning has the potential to increase student engagement significantly compared to conventional methods.[2] On the other hand, research conducted (Hatlevik & Radtke, 2023), emphasizes that access to technology without improving teachers' teaching skills will only create a "second digital divide" between students who benefit optimally from technology and those who do not.[3] In the Indonesian context, research (Hamid et al., 2020), found that limited infrastructure and lack of digital training reduce the efficiency outcomes of online learning.[4] Therefore, there is a need to further evaluate how digital transformation affects the quality of education in different social and geographical contexts.

[1] John, D. (2020). Coronavirus (COVID-19) and Online Learning in Higher Institutions ofEducation: A Survey of the Perceptions of Ghanaian International Students in China. *Online Journal of Communication and Media Technologies*, *10*(3), 0–9. https://www.ojcmt.net/download/coronavirus-covid-19-and-online-learning-in-higher-institutions-of-education-a-survey-of-the-8286.pdf , John, D. (2020). Coronavirus (COVID-19) and Online Learning in Higher Institutions ofEducation: A Survey of the Perceptions of Ghanaian International Students in China. *Online Journal of Communication and Media Technologies*, *10*(3), 0–9.

[2] Heilporn, G., Lakhal, S., & Bélisle, M. (2021). An examination of teachers' strategies to foster student engagement in blended learning in higher education. *International Journal of Educational Technology in Higher Education*, *18*(1). https://doi.org/10.1186/s41239-021-00260-3,

[3] Hatlevik, O. E., & Radtke, I. (2023). *B Ili T I*. 0–3.

[4] Hamid, R., Sentryo, I., & Hasan, S. (2020). Online learning and its problems in the Covid-19 emergency period. *Jurnal Prima Edukasia*, *8*(1), 86–95. https://doi.org/10.21831/jpe.v8i1.32165

This research aims to analyze the impact of digital transformation on the quality of education, with a focus on how the use of technology affects the teaching and learning process, student engagement and the ability to equalize access to education. Apart from that, this research also aims to identify the challenges and opportunities that arise in implementing digital education, especially in Indonesia. By analyzing various aspects, such as infrastructure readiness, teacher skills, and socio-economic factors, this research is expected to provide a comprehensive picture of how education can be improved through technology. We hope that the results of this study can become recommendations for policy makers to accelerate educational transformation effectively and comprehensively.

This research argues that digital transformation in education can improve the quality of education if implemented appropriately and comprehensively. However, this success is highly dependent on three main factors: fair access to infrastructure, improving the digital skills of educators, and policy support from the government. If these factors are not met, the application of digital technology risks widening education gaps. For example, students from low-income families who don't have enough devices may fall behind during online learning. Therefore, the first conclusion from this research is that technology is not an automatic solution for improving the quality of education but is a tool that requires a systematic approach to be effective (van Dinter et al., 2021).[5]

The aim of this research is to assess the impact of educational transformation in the digital era on the traditional role of teachers in the learning process. Analysis of the challenges teachers face in adapting to changes in their roles due to digital transformation in education. By detailing the objectives of this research, it is hoped that it can create a solid foundation for a comprehensive analysis of the impacts, challenges and opportunities related to educational transformation in the digital era, especially the role of teachers in the learning process.

Method

[5] van Dinter, R., Tekinerdogan, B., & Catal, C. (2021). Automation of systematic literature reviews: A systematic literature review. *Information and Software Technology*, *136*(March), 106589. https://doi.org/10.1016/j.infsof.2021.106589

This research will adopt a qualitative approach by relying on library analysis as the main methodology. This approach was chosen to understand in depth the impact of educational transformation in the digital era on the traditional role of teachers, as well as to identify emerging challenges and opportunities. This research identifies and selects relevant literature that covers the main aspects of educational transformation in the digital era. These libraries will involve journal articles, books, and other academic sources that present research results, theories, and related expert views (Aguinis et al., 2023).[6] The research location is at SMK NU Banyuwangi with a focus on transforming the quality of education in the digital era.

The data sources for this research are; (1) Primary data sources: Interviews with teachers, school principals and other stakeholders; (2) Secondary data sources: Social media data, website data, and mobile application data. The informants for this research were the principal, administrators, teachers and students of NU Rogojampi Vocational School, totaling 25 people.

Table 1: Research Informant

No	Informan	**Kode**	**Jenis Kelamin**		**Jumlah**
			Laki-laki	Perempuan	
1	Leader of SMK NU	Lea	2		3
2	Pengelola SMK NU	Peng	3		5
3	Guru SMK NU	GS	3		3
4	Siswa SMK NU	SS	4		2
Total					25

The research paradigm used in this research is the constructivist paradigm. This paradigm views knowledge as the result of human construction through interaction with the world. The data collection techniques used were: (1) In-depth interviews with informants to explore their information and perspectives on the quality of education in the digital era; (2) Observation, namely direct observation at the research location regarding the quality of education in the marketing of Vocational School NU Rogojampi;

[6] Aguinis, H., Ramani, R. S., & Alabduljader, N. (2023). Best-Practice Recommendations for Producers, Evaluators, and Users of Methodological Literature Reviews. *Organizational Research Methods*, *26*(1), 46–76. https://doi.org/10.1177/1094428120943281

(3) Documentation of content and research results on the transformation of educational quality in the digital era. Checking the validity of the data will be carried out using method triangulation, data source triangulation, and researcher triangulation. The data analysis techniques used are: data reduction, data presentation and drawing conclusions.

Result and Discussion

Opportunities in Digital Education Transformation

Developing digital competence for teachers and students. Digital training for teachers and students is important. Teachers need to be skilled in using technology for teaching, while students must be equipped with digital skills to be ready to compete in an increasingly technology-based world of work. Integration of technology in the curriculum The use of special software, digital simulations and learning applications can improve students' understanding of material that focuses on practical skills. NU Rogojampi Vocational School can also develop a technology-based curriculum to accommodate the needs of the digital industry. Partnerships with the technology industry Collaboration with technology companies can open up internship opportunities, special training, or certification for students. These partnerships help students gain hands-on experience and adapt skills to market needs. Utilization of Online Learning Platforms Online platforms help NU Rogojampi Vocational School students spread across various locations to gain equal access to education. In addition, online learning opens up learning flexibility and expands access to learning materials. Digital Business Development Opportunities Vocational school students in business, marketing, or design can utilize digital technology to learn digital business skills such as online marketing, e-commerce, and graphic design. Infrastructure Readiness Discussions regarding infrastructure needs such as stable internet access, supporting hardware, and digital laboratories in vocational schools are also important points. Adequate infrastructure is an important foundation in supporting digital transformation. Government Policy and Support Government support in the form of regulations, funds and digitally oriented educational policies is also taken into account so that educational transformation can be effective. The head of Vocational School NU Rogojampi explained how he thinks about digital transformation at Vocational School NU Rogojampi so that it can be accepted by students.

> *Digital learning allows us to learn more interactively and in depth, especially if there are simulations or training that is similar to real work. So far, we have*

studied theory more often, and if with technology we can practice directly, this will definitely help us understand the material more quickly. (KS)

The millennial generation also has a great interest in technology-based education, as well as self-development through digital media. With the online registration system, schools not only facilitate their need for easy access, but also support their interest in utilizing technology for their educational needs. This shows that schools have adapted to the behavioral patterns and digital preferences of the current generation, so as to attract greater interest and facilitate a more efficient selection process.

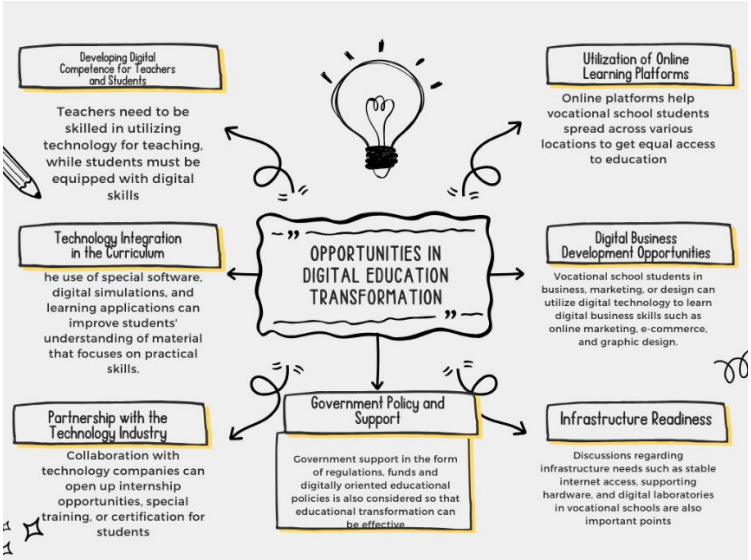

Figure 1: Opportunities in Digital Education Transformation

The transformation of digital education at NU Vocational Schools not only provides great opportunities to improve students' skills but also faces challenges that require the cooperation of many parties to achieve optimal results. Overall, the digital education transformation at Vocational School NU Rogojampi requires collaboration between schools, government and industry to create a relevant and competitive learning environment, so that students are ready to face the demands of a digital-based world of work. [7]

Use of Technology in Teaching and Learning

[7] Sadjadi, E. N. (2023). Challenges and Opportunities for Education Systems with the Current Movement toward Digitalization at the Time of COVID-19. *Mathematics*, *11*(2), 259., Karaboga, T., Gurol, Y. D., Binici, C. M., & Sarp, P. (2021). Sustainable digital talent ecosystem in the new era: impacts on businesses, governments and universities. *Istanbul business research*, *49*(2), 360-379.

Increasing the practice of vocational skills in digital technology, such as design software, engineering simulations, and business management applications, allows NU Vocational School students to practice vocational skills in more depth. Students studying engineering, business, and graphic design, for example, can use simulation software that provides close-to-real experiences. This helps them better understand and master the skills required in the industry. Interactive learning methods that increase understanding of technology such as learning videos, interactive simulations, and virtual reality are used to make learning more interesting and interactive. With this approach, students are more involved in the learning process, so that their understanding of the material improves. This interactive method also helps teachers explain complex concepts visually, especially in the fields of engineering and automotive. Access to digital resources and references By utilizing the internet and learning platforms, NU Vocational School students and teachers can access various resources such as e-books, scientific articles and online tutorials that are relevant to their expertise. This access enriches the material provided in class and allows teachers to develop curricula according to current industry needs. Developing digital skills that are relevant for the world of work. NU Vocational School students who are involved in using technology in learning gain important digital skills such as operating special software, understanding automation technology, and mastering digital communication tools. These skills are very relevant to future job demands, especially because many industries have shifted to digital technology.

> *"There are several challenges, especially regarding infrastructure and skills. Even though schools have adequate internet connections, sometimes the signal is unstable, which hinders the use of online platforms. Additionally, not all teachers and students have the same technological skills. We need more training to ensure all teachers and students can utilize technology effectively."*

From interviews, several main challenges were found in implementing technology at Vocational School NU Rogojampi, even though the school has an adequate internet connection, the problem of signal stability is still an obstacle. This network disruption hinders the use of online learning platforms and often disrupts the teaching and learning process, especially when accessing material that requires stable internet.

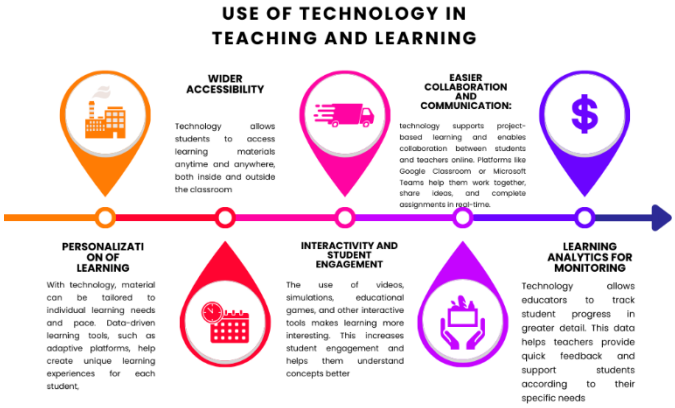

Figure 2: Technology in Teaching and Learning

To realize optimal use of technology in learning, schools need to address infrastructure challenges and improve the digital skills of all teaching staff and students. By overcoming signal problems and providing intensive training, it is hoped that technology can better support the teaching and learning process, improving the quality of learning in vocational schools.[8]

Teacher Readiness and Training

The importance of technology readiness in teaching for NU Vocational School teachers who are expected to be ready and familiar with the use of technology in teaching so they can integrate it well into the learning process. Many teachers are aware of the benefits of technology to improve student interaction and understanding, but some still face obstacles in operating digital devices or special software. Teacher digital competency training Regular and thorough training is essential so that teachers can develop the required digital skills. Training includes the use of educational software, online learning applications, as well as specialized software for specific fields such as graphic design, accounting, or engineering. This training program also involves the introduction of new technology relevant to the curriculum, such as the use of simulations and AI-based applications in vocational learning. Developing technology-based learning

[8] Pambudi, N. A., & Harjanto, B. (2020). Vocational education in Indonesia: History, development, opportunities, and challenges. *Children and Youth Services Review*, *115*, 105092. Fitria, T. N. (2023). Augmented reality (AR) and virtual reality (VR) technology in education: Media of teaching and learning: A review. *International Journal of Computer and Information System (IJCIS)*, *4*(1), 14-25.

materials Teachers need training to design technology-based learning materials, such as digital modules, learning videos and interactive content.

This training helps teachers create interesting material that suits the skill needs of NU Vocational School students. With technology-based materials, teachers can provide learning experiences that are more practical and in line with industry standards. Increasing Interactive and Innovative Learning Methods Teachers at NU Vocational Schools are trained to use interactive learning methods, such as project-based learning, digital simulations and educational games. This approach is designed to increase student participation and facilitate understanding of complex material. With this training, teachers are expected to be able to create a learning environment that is more interesting and relevant to students' interests.

> *"Teachers' readiness to use technology currently varies quite a lot. Some teachers are used to technology and can integrate it into teaching, but there are also those who still struggle. Therefore, we rely heavily on training programs to help them improve their digital skills. We hold this training regularly and involve experts from the industry."*

The results of interviews regarding Teacher Readiness in Using Technology at NU Vocational Schools show that the level of teacher readiness in using technology still varies. Some teachers have been able to integrate technology into the learning process smoothly, while others are still experiencing difficulties. To bridge this skills gap, schools rely heavily on training programs. These trainings are designed to improve teachers' digital skills and are carried out regularly.

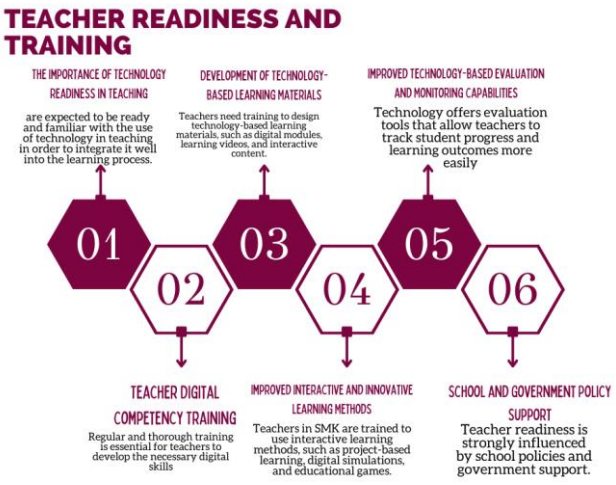

Figure 3: Teacher Readiness and Training

From the findings above, it can be concluded that teacher readiness and training in educational technology plays an important role in creating effective and relevant learning. Teachers need to have basic skills in using technological devices, both hardware and software, as teaching aids. They are also required to have an open attitude towards innovation, as well as the ability to adapt to new technology introduced in the classroom. To support this readiness, technical training that focuses on mastering digital tools and platforms is crucial, accompanied by technology-based pedagogical training so that teachers are able to integrate technology with effective teaching methods.[9] Apart from that, developing soft skills in virtual classroom management, digital communication, and critical skills in selecting online resources is also needed to support digital learning. This training must be carried out on an ongoing basis so that teachers remain able to adapt to technological developments and changes in student learning needs.

Conclusion

This section gives the conclusion for research done by the author and its contribution to the topic of this Journal. Authors are advised not to replicate conclusion by the abstract. This section states merely what the researcher thinks the data mean, and as such, should relate directly back to the problem or question stated in the introduction. This section should not offer any reasons more for those particular conclusions (*this should have been presented in the discussion sections*). By looking at only the introduction and conclusion sections, a reader should have known what the researcher has investigated and discovered even though the specific details of how the work was done unknown.

[9] Safyari, S., & Rezaei, E. (2024). Identifying the Criteria for Techno-Pedagogical Competencies of Faculty Members in Blended Learning Implementation: A Review. *Interdisciplinary Journal of Virtual Learning in Medical Sciences, 15*(1), 18-32.

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