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THE ADAPTATION OF TEACHERS AND STUDENTS TOWARD DIGITAL LEARNING AT SMA NEGERI 1 SUSUKAN AMID TECHNOLOGICAL LIMITATIONS

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Abstract

This study explores how teachers and students at SMA Negeri 1 Susukan adjust to digital learning while dealing with limited technological resources. The research was conducted using a descriptive qualitative approach with classroom observation and interviews to obtain comprehensive information about teachers' and students' adaptation strategies, obstacles, and perceptions. The results show that teachers have adopted digital media such as projectors, PowerPoint, instructional video materials, and Google Forms, although the implementation is inconsistent because of unavailable devices, unstable internet connections, and limited facilities. Furthermore, students also respond positively to digital lessons, even though they face similar challenges of limited internet access, personal devices, and confusion when teachers do not provide detailed explanations. These findings confirm the Diffusion of Innovation and Community of Inquiry theories that adaptation has been implemented, but it has not been optimized due to the lack of infrastructure support and teaching presence. Therefore, this study is important to provide an empirical description about the challenges of digital adaptation in schools with limited technology and serve as a reference for developing programs to improve technology infrastructure and strengthen teachers' and students' digital competencies.

Keywords: *Student Adaptation; Teacher Adaptation; Digital Learning; Technology Limitations.*

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A. INTRODUCTION

The development of information and communication technology (ICT) in the digital age has brought significant changes to the world of education (Maulana, 2024). The learning process, which was previously teacher-centered, has now shifted to a more open, collaborative, and digitally based system (Picauly, 2024). This transformation not only requires students to have digital literacy skills but also requires teachers to be able to adapt to teaching methods that utilize technology as the main medium. Technology has now become a vital component in learning, playing a role in enhancing social interaction, critical thinking skills, and learning effectiveness in various educational contexts (Maulana, 2024).

However, these changes are not always easy to implement in all educational units, as their implementation presents various challenges (Picauly, 2024). Real challenges arise, especially in schools located in areas with limited infrastructure, where technological facilities are not yet fully adequate. This is very relevant to the conditions at SMA Negeri 1 Susukan, where the implementation of digital learning still faces obstacles in terms of facilities and infrastructure. This situation reflects the existence of a “digital divide” (Maulana, 2024), which causes the adaptation process of teachers and students to digital learning to be slow and challenging.

In addition to infrastructure factors, understanding and education related to the use of learning technology also pose their own challenges. Teachers who are not well-trained in utilizing educational technology tend to have difficulty integrating digital media into their learning strategies (Maulana, 2024). This shows that improving teachers' digital literacy and competence is an important prerequisite (Kharismawati et

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al., 2025) in realizing meaningful and inclusive digital learning in the midst of this era of transformation.

Previous studies have highlighted the phenomenon of digital adaptation in urban schools with more complete facilities. However, studies examining how this adaptation occurs in rural schools or areas with limited technology are still relatively few. Picauly (2024) specifically identifies a gap analysis in crucial areas, namely the “Access Gap” to technology and “Educator Readiness.” Therefore, this study focuses on examining in depth how teachers and students at SMA Negeri 1 Susukan adapt to digital era learning amid limited facilities, while also filling the research gap regarding adaptation in environments with access challenges (Maulana, 2024).

Based on the above description, this research attempts to answer the main question: what are the forms of teachers' and students' adaptation to digital learning at SMA Negeri 1 Susukan, which still faces technological infrastructure limitations, and what factors influence the success of this adaptation?

Theoretical Framework

1. Educational Adaptation

Educational adaptation is a process of adjustment that is carried out by individuals or institutions in response to environmental changes, social pressures, and technological advances that influence the teaching and learning system. In the Diffusion of Innovations theory, Rogers (1995) suggests that the adaptation occurs through several stages, which include the development of knowledge, perceptions, decisions, implementation, and confirmation of a particular innovation (Rogers et al., 2014).

In the educational context, teachers and students must pass it along to integrate technology into the classroom. Fullan (2007) emphasizes that the potential for successful implementation of adaptation in education is dependent on the ability of educators to realize changes and transform learning approaches comprehensively, not just technically (Fullan, 2016). Meanwhile, Schneiders' (1964) adjustment theory



explains that self-adjustment is an effort made as a response to the demands of new environments in order to achieve social and psychological balance.

National education programs and the social-economic conditions of communities, including Indonesia, also influence education adaptation. Huriyatunnisa (2022) shows that some teachers in primary and middle schools face significant problems when trying to integrate online learning during the pandemic due to limited digital competency and supporting facilities (Huriyatunnisa, 2022).

Furthermore, Nugroho et al. (2024) stated that technological adaptation in teaching and learning should be followed by training in technology and a change in teachers' mindset towards not only applying digital media but also designing effective and meaningful learning. As a result, implementing technology in teaching and learning is not merely about applying new methods but also about transforming classroom teaching paradigms that are relevant to the dynamic demands of the digital era (Nugroho et al., 2024).

2. Digital Learning

Digital learning is a process that is conducted by using technology as a means of interaction, collaboration, and material transfer. Garrison and Anderson (2003), utilizing the Community of Inquiry framework, emphasize three main components in digital learning: cognitive presence, social presence, and teaching presence (Vaughan et al., 2013).

The cognitive presence refers to the students' ability to build and develop understanding through structured discussion and reflection. Moreover, social presence is measured by exploring the extent of learners' active participation with the teacher and classmates, both socially and emotionally, even though the learning activity is done virtually. Additionally, teaching presence highlights how the teacher can design, facilitate, and guide the learning experience to be targeted, focused, and comprehensive. These three elements are complementary to each other, so online learning does not replace the essence of the interaction.



Bates (2015) adds that digital learning requires a pedagogical redesign, where technology is not only a tool but also a particular learning environment that requires specific strategies. According to the theory of connectivism, Siemens (2005) interprets that learning in the digital era is a process of developing and maintaining information networks (Goldie, 2016). In this case, the role of teachers moves from primary knowledge resources to facilitators who assist students in accessing, verifying, and utilizing digital information.

In addition, Izzah et al. (2025) also found that teachers' digital competence is a primary factor in the achievement of technology-based learning, where teachers must be balanced in integrating values, technology, and pedagogy (Izzah et al., 2025). Therefore, digital learning is not merely a transformation of media but a comprehensive change in the mindset, interaction, and teaching methods.

3. Technology Limitations

Technology limitations or the digital divide are one of the most significant obstacles in integrating modern learning in schools, especially in locations with uneven infrastructure. Van Dijk (2012) explains that the digital divide is not just a problem of access to the devices and the internet but also includes differences in skills, motivation, and social support for using technology (Van Dijk, 2012). Warschauer (2003) strengthens this insight by emphasizing that digital inclusion requires three aspects: physical access to devices, digital competence, and a social context that supports users (Warschauer, 2003).

Physical access relates to the availability of devices such as computers, smartphones, and proper internet networks. Digital competence encompasses an individual's ability to use technology to explore, process, and utilize information productively. While the social context refers to the economic, cultural, and institutional environment that determines the extent to which technology can be used effectively in learning activities. These three aspects influence each other; physical access without adequate digital skills or individual competence without social support will equally obstruct the optimal use of technology.



In Indonesia, research by Sinambela et al. (2024) found that the lack of technology is a major challenge in online learning effectiveness, specifically in rural areas like Semarang Regency. Some factors, such as internet connectivity, device availability, and teachers' and students' digital competency, have directly impacted the success of digital learning adaptation (Sinambela et al., 2024).

On the other hand, UNESCO (2020) highlights the importance of digital policy and strategies to make sure that these gaps do not widen learning quality disparities between regions. This means that technological disruptions should be understood not only as technical issues but also as social and structural problems that require systemic solutions, such as digital training, infrastructure provision, and supporting inclusive education policy.

Based on these three theoretical frameworks, educational adaptation in the digital age cannot be separated from the ability of teachers and students to adapt to the technology-based learning system, considering the lack of infrastructure. The Diffusion of Innovation theory (Rogers, 1995) explains the mechanism of adaptation, and the Connectivism theory (Siemens, 2005) and Community of Inquiry theory (Garrison & Anderson, 2003) explain the dynamics of digital learning, while the Digital Divide theory (Van Dijk, 2012) helps to understand the context of the technology gap. These formed a complementary conceptual foundation for analyzing how teachers and students at SMA Negeri 1 Susukan adapted to digital learning despite technological limitations.

B. RESEARCH METHOD

This study employs a qualitative descriptive research design to describe and analyze the phenomena faced by teachers and students in the process of adapting to digital learning at SMA Negeri 1 Susukan, Semarang Regency. This school was chosen due to its limited technological access, making it a relevant location to explore the challenges and experiences of educators and learners. The qualitative descriptive



approach allows the researcher to gain a deep understanding of participants' perspectives through systematic interviews and observations.

The participants in this study consist of three subject teachers and ten eleventh-grade students who are actively involved in digital learning activities. Participants were selected using a purposive sampling strategy, prioritizing those with direct experience in the learning process that integrates technology, despite the limitations. This aims to gain rich insights into how they adapt and interact in a challenging learning environment.

Data collection was conducted through two main methods: semi-structured interviews and classroom observations. The interviews were designed to explore participants' experiences, perceptions, and adaptation strategies toward digital learning and were conducted individually with permission to record. Classroom observations were carried out five times during offline learning sessions to document the dynamics of interaction between teachers and students as well as the overall learning process. The data obtained from both sources were then analyzed using Miles and Huberman's (1994) interactive model, which includes three steps: data reduction, data display, and conclusion drawing or verification.

To ensure the credibility of the findings, data triangulation was applied by comparing information obtained from interviews and observations. This helps to ensure the consistency and validity of the collected data. Ethical considerations were also a primary focus in this study, where the researcher obtained permission from the school authorities and explained the purpose of the research to all participants. Each participant was asked to provide voluntary consent with guarantees of confidentiality and anonymity of the data they provided to ensure the protection of their privacy.

C. RESULTS AND DISCUSSION

1. Teachers' Adaptation

Interviews with teachers indicate that digital learning has been implemented at SMA Negeri 1 Susukan, including the use of projectors, PowerPoint presentations, Google Forms, and several online evaluation platforms. However, its



utilization has not been optimal due to limited infrastructure, such as malfunctioning projectors, unavailable adapters, and unstable internet connections. This situation requires teachers to adapt their methods, reverting to conventional learning methods such as lectures and whiteboard explanations when technology devices are unavailable.

Teachers also reported that the use of technology is not always effective, as some students lose focus when allowed to use gadgets. Furthermore, technical constraints such as unstable signal strength and inadequate personal devices also hinder the success of digital learning. Nevertheless, teachers continue to view technology as a tool that supports the learning process, particularly in presenting more systematic and varied material. Factors supporting teacher adaptation to digital learning include adequate digital literacy skills, a willingness to learn, and creativity in designing engaging lessons.

2. Students' Adaptation

Findings from student interviews indicate that most students had positive experiences with digital learning. They were accustomed to using digital devices, making the adaptation process to using technological media relatively easy. Media such as PowerPoint presentations, learning videos, PDF materials, and Google Forms were considered helpful in improving understanding due to their visual and structured presentation.

However, students also identified several significant obstacles, particularly limited internet access, insufficient data quotas, and unsupported devices. Students stated that the unstable school Wi-Fi signal was a major obstacle to participating in digital learning. Furthermore, some students felt confused when teachers presented digital materials without further explanation, resulting in poor comprehension. Some students also felt that the ease of access to information through technology actually made them more dependent on artificial intelligence, thus reducing their motivation for independent learning.

3. Discussion



The findings indicate that teachers and students at SMA Negeri 1 Susukan have adapted to digital learning, although not optimally due to limited facilities and competencies. These results are relevant within the theoretical framework of Educational Adaptation and Diffusion of Innovation from Rogers (1995), which explains that acceptance of innovation, in this case learning technology, is influenced by the steps of knowledge, persuasion, decision, implementation, and confirmation.

In SMA Negeri 1 Susukan, both teachers and students have passed the knowledge to implementation steps, as seen by the utilization of PowerPoint, Google Forms, instructional videos, and other tools. However, the adaptation process has stalled at the complete implementation step because of technical problems such as nonfunctional projectors, unavailable adaptors, and unstable internet connections. This condition shows that the confirming step has not been successfully realized, which follows from Rogers' explanation that adaptation will weaken when technical support is inconsistent.

Furthermore, the finding that teachers must switch back to traditional methods when devices are not functional also supports Fullan's (2007) theory, which emphasizes that educational adaptation requires a pedagogical transformation and systemic support, not only the availability of technological tools. Teachers at SMA Negeri 1 Susukan have shown a willingness to adapt, as seen in their creativity in designing digital materials, but the school's support structure is limited. This point is reinforced by Schneider (1964), who states that adaptation will be hampered if environmental demands outgrow the capacity of human and institutional resources.

On the side of digital learning, the finding that students feel helped by visual media such as PowerPoint, Google Forms, and videos is consistent with the concept of cognitive presence in the Community of Inquiry theory (Garrison & Anderson, 2003). Structured digital media assist learners in developing understanding, but challenges arise around teaching presence, particularly when teachers do not



provide additional explanations to digital materials, which causes confusion among students. This highlights that effective digital interaction not only depends on technology but also on pedagogical design that reinforces direction, guidance, and clarification from teachers.

Besides that, the fact that some students have become dependent on artificial intelligence and lost motivation to learn independently is also relevant to Connectivism theory (Siemens, 2005). It emphasizes that digital learning is a process of integrating digital information, although relying on external sources without reflection can weaken the internalization of knowledge. Therefore, it shows that student adaptation is still at an early stage, where the ability to choose, verify, and analyze digital information has not optimally improved.

The technological limitations identified, which include unstable internet access, unavailable quota, and unsupported devices, are directly confirmed by the Digital Divide theory of Van Dijk (2012) and Warschauer (2004). In the school condition, the three aspects of the digital divide are seen clearly.

- a) Physical access is evident in projector malfunctions, no adapters, and lack of students' devices.
- b) Digital competence can be seen when some teachers struggle to optimize using technology and students get confused when the materials are not explained.
- c) Social context refers to the economic conditions of students and the infrastructure that hinders using technology.

All these components mentioned by Warschauer reinforce each other and explain why digital adaptation has been partial rather than comprehensive.

From Indonesia's educational perspective, it also aligns with the findings of Huriyatunnisa (2022) and Nugroho et al. (2024), which emphasize schools in regions with limited facilities for information and communication technology (ICT) have unstable levels of digital adaptation. In the case of SMA Negeri 1 Susukan, teachers and students have shown learning readiness and willingness, while the



technology gap has become the main factor that impacts the effectiveness of adaptation.

Overall, the results of the study show that teachers and students have adapted to digital learning, but not completely in accordance with the standards of modern educational adaptation theories. Explanations from Rogers, Fullan, Garrison & Anderson, Siemens, and Warschauer indicate that digital adaptation cannot be separated from the availability of infrastructure, digital competence, and consistent pedagogical design. When either factor weakens, the adaptation process becomes fragmented, as seen in the case at SMA Negeri 1 Susukan.

D. CONCLUSION AND SUGGESTION

CONCLUSION

The results indicate that teachers and students at SMA Negeri 1 Susukan have applied it in the classroom but have not effectively implemented it due to significant technological limitations. Despite teachers' attempts to use various digital media such as projectors, PowerPoint, videos, and Google Forms, the practice has been unstable because of devices that cannot be used, unavailable adaptors, and unreliable internet connections. This makes teachers move back to traditional methods and obstructs the consistency of pedagogical transformation.

Students responded positively to digital learning and enjoyed visual content, but lack of data, internet access, and personal devices, along with insufficient follow-up from teachers, caused learning to be less than optimal. Additionally, some students became dependent on artificial intelligence (AI), which can reduce independent learning efforts.

In theoretical terms, these results reinforce the understanding that the education technology adoption requires a proper supporting system. The adaptation process that was found is still in the beginning phase of development within the Diffusion of Innovation framework and has not reached the confirmation stage due to a lack of supporting infrastructure.



On the other side, the Community of Inquiry framework also illustrates that cognitive presence is formed through digital media; teaching presence is not yet strong enough for students to develop a better understanding. The obstacles that have emerged reflect the existence of a digital divide between physical access, digital competence, and social context.

In conclusion, the research emphasizes that digital adaptation cannot be achieved independently by teachers and students; it must be supported by the availability of ICT tools, network stability, and school support, as well as the enhancement of lesson plans and digital competencies. The transformation can be sustainable when technical and pedagogical aspects are improved simultaneously.

SUGGESTION

Based on the findings of this study, several recommendations are proposed to enhance digital learning in schools with limited technological access. Schools should prioritize improving ICT infrastructure, strengthening teachers' digital competencies, and reinforcing pedagogical support to ensure consistent learning quality. Future research may also broaden its focus through the following directions:

1. Geographical and Socioeconomic Differences

Future studies may examine how digital learning strategies vary across rural, suburban, and urban schools, considering differences in technological access, funding, and community support that influence institutional readiness.

2. Comparative Analysis of Technological Infrastructure

Comparative research between schools with strong and limited technological resources can help identify differences in adaptation strategies, critical enabling factors, implementation challenges, and effective forms for support.

3. School Management and Leadership

Further research may explore how school management contributes to digital learning success, particularly in budgeting, device maintenance, and policy development, as these leadership decisions strongly effect teachers' and students' digital adaptation.

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