INNOVATION IN TEACHING AND LEARNING EDUCATION IN THE DIGITAL ERA

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Abstract

As human needs become more complex, educational technology is not only using tools (machines) for learning in the current era of information technology. Innovative teachers can create a learning environment that motivates students, increases creativity, and stimulates their interest in learning. This study aims to determine the description of innovation in teaching and learning education in the digital era. The research method used is the Library Research Method. The data that has been collected is triangulated and reduced to produce conclusions. Education, especially State Senior High School 1, Pasir Penyu District, Indragiri Hulu Regency, is one of the instruments affected by the reform movement with four students as subjects. Researchers found several important aspects regarding teaching and learning in the digital era, namely, learning in the digital era has different characteristics from student learning in the past; the generation in this era are those with digital native characters. Students today are born, grow, and grow up in direct contact with the digital world, so the information obtained will be different from previous students. Innovation in teaching and learning is a discovery that can be an idea, item, event, or method observed as something new for the world of education, such as using media in the learning process and utilizing smartphones for learning. Other media that can help students learn well, media here is an innovation. Teachers, as partners in learning, must be able to design learning activities so that students obtain more information than the time provided.

Innovation in Teaching and Learning Education in the Digital Era

Introduction

Technology in Teaching and Learning is an Opportunity and Challenge in the Digital Era Technology has brought about significant changes in the teaching and learning process, opening doors for students previously limited by geographical, distance, or physical limitations. (Farida, 2019). Digitalization allows students to access learning materials anytime and anywhere and allows them to interact with learning content more interactively. Improving Interactive Learning Experiences: Technological advances have facilitated the creation of more interactive and personalized learning experiences using technological devices such as computers, smartphones, and tablets; students now have access to diverse and innovative learning resources. Digital textbooks, interactive learning media, and virtual simulators are examples of technology that has changed how students understand class material (Farida, 2019). In education, digitalization will bring rapid progress, namely the emergence of various learning resources and the spread of mass media, especially the internet and electronic media, as sources of knowledge and centers of education. The impact is that teachers/educators are not the only source of knowledge. As a result, students can certainly get sources of knowledge and can master knowledge that teachers and students have not mastered. Therefore, it is not surprising that in this digital era, the authority of teachers, particularly parents, in the eyes of students has declined.

Digitalization now has such a strong magnet that its existence defeats the influence of the presence of teachers in the classroom. According to Prensky (2010), Today's students can indeed be said to be digitally native. They were already familiar with gadgets when they were born and growing up. So, it is only natural that the world of education (schools) changes to follow the times. Technology in learning in the digital era offers excellent opportunities to improve the quality of teaching and learning. However, some challenges must be overcome, such as the digital divide and the need for teacher training. With thorough preparation and proper professional development of educators, technology can reach its maximum potential to improve education, especially at State Senior High School 1, Pasir Penyu District, Indragiri Hulu Regency.

The implementation of digital innovation in education is not without challenges. The gap in access to technology, the adaptability of teaching staff, and data security are important issues that must be considered. However, the potential for technology to revolutionize the education system remains enormous as long as these challenges can be adequately addressed. Digital-based educational innovation must also be supported by policies that ensure that all parties can feel the benefits, especially in areas with limited technological infrastructure. According to Eric Sheninger (2019), educational teaching and learning innovation in the digital era aims to create quality and practical education, motivate students to love learning, and provide good examples and models in various matters related to implementing learning declarations. Teachers find it easier to convey learning messages and create a pleasant learning atmosphere. The implication is that students' understanding of the material being taught will increase. Educators can ideally utilize technological advances in

learning to increase students' potential, not vice versa. The ability to use information technology between millennial students and the previous generation is undoubtedly different. So, with the provision of mastery of information technology, it can be used as an added value in supporting student learning activities in the classroom.

Innovations in teaching and learning in the digital era have changed how students learn, from traditional teacher-centered methods to more interactive, personalized, and technology-based learning. By utilizing e-learning, gamification, and broad access to information, students now have more opportunities to develop their potential optimally. However, challenges remain behind all these innovations, especially regarding equal access to technology in various regions. Therefore, it is important for all parties, including the government, schools, and the community, to work together to ensure that educational technology is accessible to all students in society to create a generation ready to face the future. According to Ally (2022), the digital era has triggered the birth of innovation in learning and various trends and issues in the scope of Educational Technology.

Digitalization in education brings significant challenges as well as opportunities. On the one hand, educational institutions face issues of inconsistent infrastructure and technology accessibility. Many schools, especially in remote areas, still lack adequate facilities and internet connectivity to implement digital learning effectively. "A key challenge in digitalizing education is ensuring equal access to technology and resources for all students." In addition, teachers need training to effectively integrate technology into teaching methods, which takes time and resources. Addressing these challenges is critical to maximizing the benefits of digitalization. However, overcoming these barriers presents a significant opportunity to improve the overall quality of education.

The trend that is ahead is the sharp increase in investment in the field of learning technology. There has been a significant change in game design, which has only been a game; now, it has provided an extraordinary learning experience to students. The availability of information in various types of digital-based has made it easier for educators and students to enrich their learning insights. In the context of learning, we also cannot avoid the negative impacts. This opportunity must be taken by experts and learning practitioners to move to get benefits by innovating and creating optimally immediately. This study will explain "Innovation in Teaching and Learning Education in the Digital Era," which occurs in the world of education, and the role that must be played by educational technology in the context of teaching and learning.

Research Method

The researcher chose the most appropriate method: teachers, participants, educational professionals, and technology experts are familiar sources of information used in technology-based educational research. A qualitative descriptive method was used in this study. According to Sugiyono (2012), this method is used to research natural object conditions, where the researcher is the primary tool. Qualitative research methods are used in natural object conditions where the researcher is the key instrument. Data collection techniques used are triangulation (combination), data

analysis is inductive, and the results of qualitative research emphasize meaning rather than generalization. In addition, Riduwan (2004), said that observation is a data collection technique in which researchers make direct observations of research objects to see directly what is being done. Thus, it is concluded that observation is a systematic observation and recording of the phenomena being studied (Farida, 2019). The research was conducted from November 2024 to April 2025. Innovation in teaching and learning in the digital era includes improving learning quality, technology use, and student engagement. This innovation is characterized by technology-based learning, STEM-integrated learning, gamification, project-based learning, the use of AI, and online learning platforms that allow access anytime and anywhere. Data sources are obtained by collecting library sources to obtain theoretical information or explanations. Data analysis techniques include summarizing, presenting data, and providing conclusions.

Results and Discussion

Education is an important factor in building the future of the nation. In today's digital era, technological developments significantly impact how students are taught and learned. Innovation in teaching and learning is significant to develop so students can adapt to various technological advances in this digital era. Old ways of learning that are no longer relevant to the times should be evaluated and improved so that the increasingly developing era does not leave students behind. Education in the digital era has significant differences from education in previous eras. This is due to the increasingly dominant role of technology in everyday life, including in the teaching and learning process. Learning in the digital era can be done online or offline and utilizes various technologies, such as smartphones, tablets, laptops, or computers. However, learning in the digital era also poses various challenges, such as uneven internet access, unequal technological capabilities among students, and a lack of understanding of using technology effectively in the learning process.

Therefore, innovation in teaching and learning is essential to overcome these challenges and improve the quality of learning and student learning outcomes in the digital era. The challenge that needs to be solved immediately is the gap between teachers and students in utilizing technology. As a young generation growing up in the digital era, students are accustomed to using the internet in their daily lives and living in a digital communication technology environment. Therefore, their communication patterns and knowledge management are greatly influenced by technology.

In various studies and literature, the term digital native is increasingly used to describe students who grow up in the digital era and are accustomed to technology. This research is important because innovation in teaching and learning education in the digital era is an urgent matter in facing the challenges of learning in the digital era. In addition, innovation in teaching and learning is also essential in adapting to the increasingly rapid development of technology.

The research results at State Senior High School 1, Pasir Penyu District, Indragiri Hulu Regency, show promising results from several student responses. The following is student response data related to teaching and learning innovations in the digital era.

Table 1. Thematics responden and naratif of audience

No	Thematics	Code	Respon Student
1	What is the Impact of Technology on Learning?	NK	In the past, before innovations in teaching and learning in the digital era, learning felt very tiring and boring, sitting and just listening to the teacher explaining the material from the book. Thank God now, it feels very different. I am more active and innovative in class and can discuss with classmates. We understand better when the material is presented with audiovisuals. Everything can be recorded directly in memory.
2	Is teaching and learning using the digital era more fun and interactive?	JE	Using digital learning media makes learning more interesting and fun and motivates to continue learning. Moreover, understanding can also be felt when teachers collaborate using projects through online platforms.
3	Can the use of digital media provide wider access to learning resources?	GB	It is because the use of digital media Digitalization can open up access to the whole world and involve students' activeness so that teaching and learning feel more memorable.
4	What challenges and opportunities can be felt with teaching and learning in this digital era?	LS	The challenges and opportunities during the digital teaching and learning era also have challenges. I must filter correct and reliable information from various existing sources and also be able to manage our study time well so as not to focus too much on technology and forget other important aspects. However, with teacher guidance and self-awareness, we can overcome these challenges and utilize technology to achieve our learning potential optimally.

Therefore, innovation in teaching and learning is essential to adapt to technological developments and utilize them optimally in the learning process.

Innovation in Educational Teaching in the Digital Era

Technology development requires an education system to adapt to the smallest line in education, namely students, to the developments that occur. This innovative step is an important thing that must also be considered and encouraged by the leader figure in the school, first related to the principal, second related to the teacher figure, and even third related to the guardian figure. (Situmorang, 2013).

Educating in the digital era requires more effort than decades ago. The development of the digital world sometimes makes the relationship between teachers and students no longer as expected. In the past, students looked forward to teachers as a means of new knowledge and insight, but now that is no longer the case. Not only that, students can also become problematic with the flow of information that is not selected, so that what is obtained through digital information exceeds what they should learn. For example, internet media is a medium that provides many benefits, but some things can be dangerous for children. Based on research conducted by the United States Department of Justice proves that around 70% of children experience bad events on the internet. Even 25% of them get sexual harassment without their

parents' knowledge. Therefore, children must be taught about the risks of using the internet.

Students in the industrial era of 4.0 have very different characteristics. The digital era will give birth to a digital native generation, which is born, grows, grows, and interacts with various digital media. This condition will directly impact psychology and affect its cognitive map. Students' needs, changes, and habits will tend to follow the things they witness through the media they see and use most often. Suppose this mechanism is not appropriately anticipated, on the other hand. In that case, it will give birth to a good generation of lying, deviant social behavior, declining school achievement, and even behavior detrimental to themselves and others.

Digitalization in the world of education is then a challenge for the use of the internet, which is growing rapidly; according to the results of research conducted by Syafril (2019), there are 171 million people out of 264 million Indonesians who have been connected to the internet, then this becomes a challenge to implement various adjustments in the world of education—Hasan (2019), One example of the form of innovation that occurs. For example, changes occur from time to time.

According to Mayer (2014), Aldrich (2005), Duffy and Jonassen (2013), and Prensky (2010), in the digital era, the role of parents, teachers, and society is critical so that children can continue to use technology for positive things and do not lose their character as future generations of the nation. The family is the central place for children to develop, so it is expected to be able to supervise and guide children in using technology. Teachers can provide good teaching and use technology for the learning process. The community plays a role in supervising and motivating children so they do not do deviant things. In addition, several things can be done to minimize the negative aspects of using information technology in education. The use of information technology for children must also be considered carefully. Do not make technology the only medium or means of learning. Optimizing the use of technology in education without eliminating applicable ethics supervising the use of technology such as cell phones by minors and enforcing the legal function that serves as the standard operating procedure for controlling the application of information technology. So, it takes cooperation from various parties so children can use gadgets optimally and for their purposes.

Greenhow & Lewin (2021), Technology used in education also has positive and negative impacts. The positive impacts of using technology in education are as follows: The use of time, costs, and logistics will be more efficient if technology is utilized in the learning process, making it easier to obtain information, and existing information will be more easily distributed without being limited by space and time and providing a broader learning experience to children.

The negative impacts of using technology in education are as follows: Changing social life; There are changes in behavior, ethics, norms, or morals of life; excessive use in children can make children antisocial because they are busy in the virtual world compared to the real world dan Addiction to using technology can also make children lazy and wasteful.

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Learning Innovation in the Digital Era

In the digital era, education faces new challenges and opportunities in optimizing the learning process. The development of the digital era has resulted in significant changes in various areas of life, including education. Now, learning innovations in the digital era, especially IT-based learning, are increasingly popular as a solution to improve the quality of education. The digital era is an era that uses technology for everything.

Regarding the context of learning, innovation through technology is necessary to improve student understanding and adapt to the times. Learning that only uses lecture methods and textbooks is often considered less interesting and less contextual for students, so it can reduce their interest and motivation to learn. In the current digital era, the development of information and communication technology has brought significant changes to the world of education. Technology can provide a more interactive, collaborative, and student-centered learning experience. The current young generation is "digital natives" who have been accustomed to digital technology since childhood, so learning that integrates technology will align with their learning style.

Rouf (2024), Through digital simulations, students can gain a more real learning experience. Online learning platforms, such as Learning Management Systems (LMS) or Massive Open Online Courses (MOOC), can facilitate more flexible and open learning. Students can access learning materials, participate in online discussions, and collaborate with other students or teachers from anywhere and anytime. The use of social media in education can improve students' digital literacy, collaboration, and critical thinking skills. Social media facilitates discussion and collaboration between students and teachers in discussing issues relevant to real life. However, the application of technology in learning also has challenges that must be faced. One of the main challenges is limited access to technology and supporting infrastructure, especially in areas with limited resources. This limited access can be an obstacle to applying technology in learning. Another challenge faced is the readiness of teachers to integrate technology effectively into the learning process. Koehler et al., (2020) That not all teachers have the competence and readiness to use technology to support the teaching and learning process. In addition, developing quality digital content that is in accordance with the curriculum is also a challenge.

Mitra (2010), states that digital content development requires special resources and expertise, which may be an obstacle for some schools or educational institutions. Therefore, learning innovation using digital technology can make learning more efficient and provide the maximum results expected. The importance of innovation in this learning can also prepare students to become active, critical, and responsible people in the digital era. Moreover, they should be able to grow their knowledge about digital technology so that other countries do not leave behind students' abilities related to technology. The form of innovation that teachers can use in the current digital era is the use of media in the learning process, utilizing smartphones for learning and other media that can help students carry out learning well; here are the learning media.
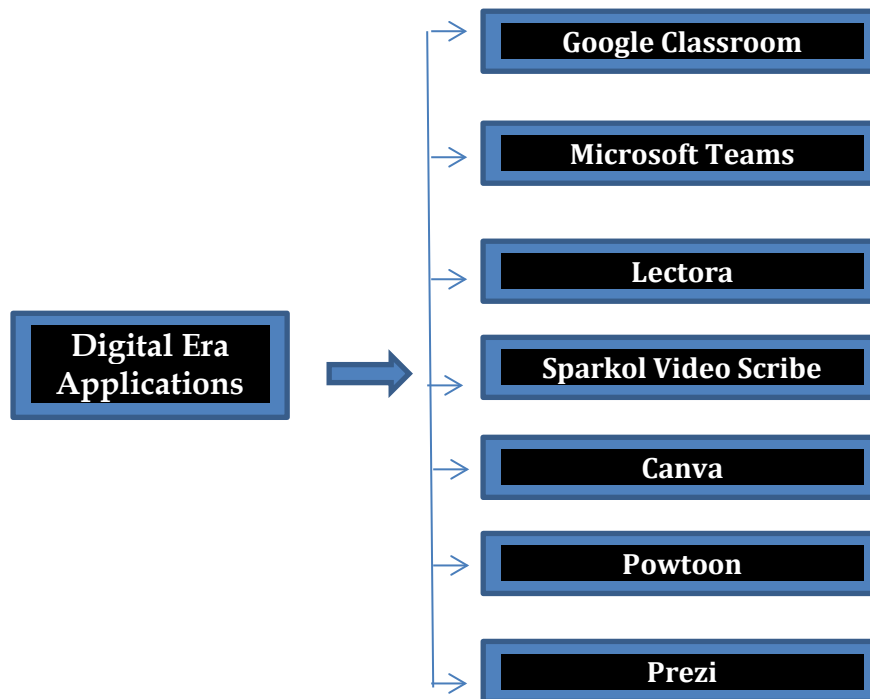
Diagram 1. Aplications digital era

Astawa (2017), several applications can be used for learning in the digital era, including Google Classroom, a Platform for creating digital classes; Microsoft Teams, a Platform for creating digital classes; Lectora: Software for developing e-learning, creating presentations, quizzes, and learning games, Canva: Application for processing graphics or visuals, such as creating infographics, material summaries, worksheets, brochures, posters, and presentation templates, Powtoon: Application for creating interactive animated presentations and videos, Prezi: Application for creating and managing online presentations, Sparkol Video Scribe: Whiteboard video presentation software with handwritten animation and Kinemaster: Application for creating learning videos.

In the field of education in Indragiri Hulu Regency, especially at Pasir Penyu 1 State Senior High School, educational innovation that occurs is also something that cannot be avoided; apart from the increasingly sophisticated development of technology, it is also because of demands in the world of education. In an educational unit, there are principals, teachers, educators, students, guardians, and school committees. In supporting the implementation of an innovation concept, it is important to implement a comprehensive change. Mansyur (2016), This will encourage the progress of an educational unit. In this way, the teaching and learning process that is carried out can lead to a discussion of opinions between a teacher and a student in order to train the concept of communicative interaction by democratic methods without eliminating the rules of science.

Use of Technology in Teaching and Learning in the Digital Era

The use of technology in teaching and learning in the digital era at State Senior High School 1, Pasir Penyu District, Indragiri Hulu Regency, was recorded as very

high, with an average score of 4.2. This shows that teachers and students have utilized technology well to support teaching and learning in the digital era. Technologies such as online collaboration applications, online learning platforms, and digital communication tools facilitate more efficient and effective interactions between teachers and students. Technology also allows easier access to learning resources, allowing students to work together more flexibly, anytime and anywhere. However, even though the use of technology is high, support still needs to be improved, with an average score of 3.5. Supporting technology, such as stable internet access, adequate hardware, and classrooms equipped with sophisticated technology, are very important to ensure that teaching and learning can run smoothly. Without adequate technological support, the use of technology in teaching and learning can be hampered, reducing the effectiveness and efficiency of the teaching and learning process.

To overcome these obstacles, the State Senior High School 1 Pasir Penyu District, Indragiri Hulu Regency, needs to invest more in technology infrastructure. This can include improving the internet network, providing computers and other devices needed for teaching and learning in today's digital era, and training teachers and students in educational technology. By improving infrastructure, State Senior High School 1 Pasir Penyu District, Indragiri Hulu Regency, can ensure that all students have equal access to the tools and resources they need to succeed in their learning. This will not only improve the learning experience of students but will also improve the overall quality of education at State Senior High School 1 Pasir Penyu District, Indragiri Hulu Regency.
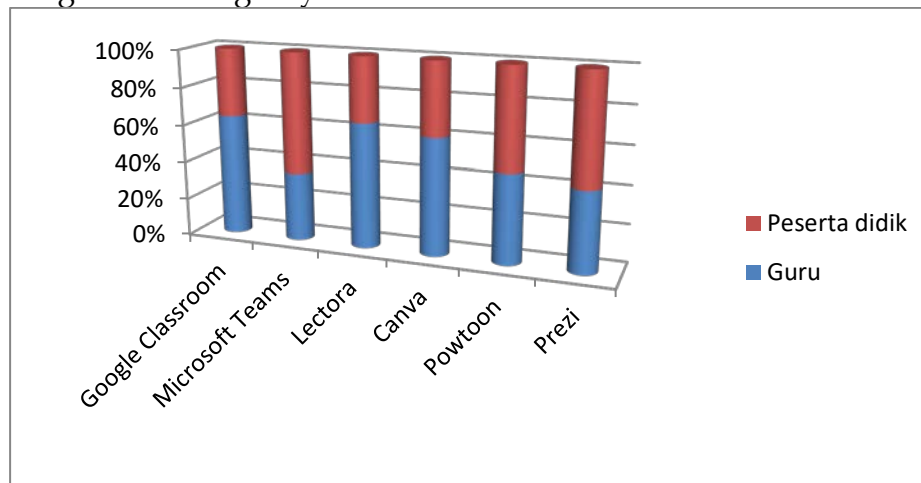

Chart 1. Use of rooting and learning media in the digital era

Conclusion

Digital learning media can provide easy accessibility so students can learn from anywhere and anytime. Innovation in Teaching and Learning Education in the Digital Era through technology is necessary to improve student understanding and adapt to developments in the era. Interactive multimedia, digital simulations, online learning, and social media can provide a more interesting, contextual, collaborative, and student-centered learning experience. However, the application of technology in

learning also has challenges, such as limited access to technology, teacher readiness, and digital content development. To face these challenges, cooperation is needed between the government, schools, teachers, and other stakeholders to provide adequate infrastructure, training, and resources. With the right innovation and adequate support, the use of technology in learning can be a solution to improving the quality of education and preparing students to become intelligent, active, critical, and responsible people in the digital era.

Acknowledgements

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