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Technology-Based E-Learning Innovation at MAN Kisaran

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A B S T R A C T

This study aims to analyze how e-learning is implemented as a technology-based educational innovation at MAN Kisaran. The research uses descriptive research methods with a qualitative approach located at MAN Kisaran. Primary data sources were obtained from several interviews with related informants, while secondary data were obtained from documents related to the research topic. Data collection techniques included observation, interviews, and documentation, with the researcher as the main instrument supported by tools such as interview guidelines and other aids. The results of this study reveal two key components of e-learning-based learning innovation: (1) Characteristics and (2) Principles. The characteristics of e-learning-based learning innovation consist of four elements: (1) Interactivity, (2) Independency, (3) Accessibility, and (4) Enrichment, all of which have been implemented effectively. Meanwhile, the principles of e-learning-based learning innovation include (1) Interaction, (2) Usability, and (3) Relevance, which have also been applied well. Additionally, there are supporting factors, such as accessibility to the e-learning website, e-learning training, and adequate human resources, as well as inhibiting factors, such as infrastructure limitations involving servers and internet networks.

Keywords: *E-Learning, Technology-Based Education Innovation*

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INTRODUCTION

The advancement of science and technology, particularly in the field of information and communication technology (ICT), has grown at an unprecedented pace in recent years. This rapid development has brought significant changes in many sectors, including education, and has reshaped the way students interact with information and knowledge. Technology integration in education, often referred to as web-based learning, online learning, or simply e-learning, is no longer just an optional supplement to the traditional classroom model. It has become an essential element in modern pedagogy that supports more interactive, flexible, and personalized learning experiences for students (Lantip, 2011: 21).

In the context of Indonesian education, Indonesian government has shown support for e-learning by issuing Ministerial Regulation of the Ministry of Education and Culture Number 68 of 2014, which outlines the roles of ICT teachers and Computer and Information Management Skills teachers in supporting the implementation of the Independent Learning Curriculum. Several benefits of e-learning-based education include: (1) Time and location flexibility. Unlike traditional classroom learning which requires students to attend at specific times, e-learning allows learners to choose when and where they want to study. (2) Independent learning. E-learning encourages learners to take charge of their educational journey, giving them freedom to decide when to begin, pause, or finish studying a module (Muluk, 2020: 36).

When learners face difficulties, they can revisit the material until they achieve understanding. Many find this approach to be more effective compared to conventional methods that force them to follow a rigid learning sequence (Ma'arif, 2023: 43). (3) Cost-

efficiency. E-learning reduces various expenses such as transportation, accommodation, administrative fees, and the need for physical facilities. (4) Personalized learning pace. The system allows students to learn at a speed that suits them. If a concept is unclear, they can repeat the lesson as many times as needed until they fully understand it. (5) Consistency in content quality. E-learning maintains consistent teaching quality regardless of the instructor's condition or mood. (6) Enhanced teaching effectiveness. Lessons can be delivered using simulations, real-world cases, gamification, and advanced animation tools. (7) Speed of distribution. E-learning materials can be instantly made available nationwide once the content is uploaded to the central e-learning server. (8) On-demand access. Learners can engage with the material anytime it suits them. (9) Automated administrative systems. E-learning uses Learning Management Systems (LMS) as platforms to manage lessons. These systems store student data, course materials, and track learning progress (Rosenberg, 2018: 78).

The relevance of e-learning became even more evident during the COVID-19 pandemic, when schools across the country were forced to transition to online learning almost overnight. Institutions that had already integrated technology into their systems adapted more smoothly, while those that relied heavily on conventional methods faced significant difficulties. This experience served as a wake-up call, reinforcing the importance of building a strong technological foundation in schools to ensure continuity and flexibility in the learning process, not only during crises but also as part of long-term educational strategies.

At MAN Kisaran, one of the leading Islamic senior high schools in North Sumatra, the implementation of e-learning reflects both an opportunity and a necessity. Situated in an urban area, MAN Kisaran serves students who are increasingly characterized as digital natives, students who are accustomed to using smartphones, laptops, and digital applications in their daily lives. Recognizing this reality, the school leadership has shown strong commitment to integrating technology into its teaching and learning processes. This commitment is evident in various initiatives such as structured training programs for teachers, the enhancement of digital facilities, and the active encouragement of both students and staff to engage with e-learning platforms as part of their academic routine.

E-learning at MAN Kisaran has brought multiple advantages. For students, it provides access to a wealth of digital resources, supports self-paced and independent learning, and offers immediate feedback during formative and summative assessments. Teachers have also benefited from this digital shift, as they are now able to design lessons that are more interactive and engaging, incorporating multimedia elements such as videos, animations, and online quizzes. Furthermore, administrative processes like grading, attendance tracking, and performance monitoring have become more efficient, allowing educators to devote more time and attention to developing quality instruction.

Nevertheless, challenges persist in the full optimization of e-learning in the school. Limitations in infrastructure, including occasional instability of the internet connection and limited server capacity, sometimes disrupt the learning process. Additionally, there are variations in digital literacy levels among teachers, with some requiring continuous guidance and professional development to adapt effectively to technology-based instruction. Despite these hurdles, the administration and teaching staff at MAN Kisaran continue to work collaboratively to strengthen their e-learning systems, recognizing that technology integration is no longer a temporary trend but a long-term investment in the quality of education.

By studying the implementation of e-learning at MAN Kisaran, this research aims to provide insights into how technology-based educational innovations can be successfully adopted in Indonesian schools. It highlights not only the achievements of this integration but also the challenges that must be addressed to maximize its potential. Through this analysis, the study seeks to contribute to a broader understanding of how e-learning can support the development of adaptive, inclusive, and future-ready education in Indonesia.

METHOD

This study employs a qualitative research method with a descriptive approach, which aims to examine data and portray social and concrete realities related to existing issues (Abdussamad, 2021, p. 41). The research focuses on the implementation of e-learning at MAN Kisaran. The primary data were obtained through interviews with selected informants who are directly involved in the e-learning process, including three English teachers, two administrators who manage the e-learning platform, and six students from different grade levels, all chosen using purposive sampling based on their relevance and active involvement with the school's e-learning activities. The main research instrument is the researcher herself, as is common in qualitative studies (Moleong, 2005, p. 20), supported by additional tools such as interview guidelines, observation sheets, and documentation tools like notebooks and cameras. Data collection techniques consisted of field observations to observe e-learning implementation during classroom and online sessions, semi-structured interviews with teachers, administrators, and students to explore their experiences, perceptions, and challenges, and documentation to gather supporting data such as school records, official reports, and visual materials relevant to the study (Ambo, 2017, p. 24). The data were analyzed using a qualitative descriptive analysis technique involving three main stages: data reduction, data display, and conclusion drawing. During the data reduction stage, relevant information was selected and simplified while maintaining its richness; in the data display stage, information was organized into narrative descriptions to make patterns and findings clearer; and in the final stage, conclusions were drawn and verified through triangulation by comparing data from different sources and collection methods to ensure the credibility and validity of the findings.

FINDINGS AND DISCUSSION

Implementation of E-Learning as a Technology-Based Educational Innovation at MAN Kisaran

The characteristics of e-learning are as follows

Interactivity

One of the characteristics of e-learning that can influence the success of learning, according to Rusman (2020:264), is interactivity, which refers to the availability of more communication channels, both direct (synchronous) through chatting or messengers and indirect (asynchronous) through forums or guestbooks. Based on observations and interviews, communication channels in this research context are used to ensure that e-learning at MAN Kisaran runs smoothly or conditionally.

As one teacher explained:

> "*Kami sering menggunakan grup WhatsApp dan fitur chat di platform e-learning untuk memberikan informasi tambahan kepada siswa. Mereka juga bisa bertanya kapan saja, sehingga komunikasi tidak terputus meskipun belajar dilakukan secara online.*" (Teacher 2, Interview, 2024)

A student also added:

> "*Kalau ada materi yang kurang jelas, saya bisa langsung kirim pertanyaan ke guru lewat chat. Biasanya dibalas cepat, jadi saya bisa paham lebih cepat.*" (Student 6, Interview, 2024)

This indicates that the presence of multiple communication channels strengthens two-way interaction between teachers and students, supporting a more collaborative learning environment.

Independence

Learner autonomy plays a crucial role in the development of e-learning-based instructional innovations. As stated by Rusman (2021:264), independence in learning refers to the flexibility in terms of time, location, teaching personnel, and instructional materials, enabling students to engage with teachers more freely and comfortably within the classroom setting. Based on interviews, one teacher noted:

> *"E-learning memang membantu siswa lebih mandiri, tapi kami masih menggunakannya terutama saat ujian. Untuk pembelajaran harian, masih banyak yang dilakukan tatap muka."* (Teacher 1, Interview, 2024)

A student also shared:

> *"Kalau saya lupa materi, saya bisa buka ulang PowerPoint yang guru upload. Belajar jadi lebih fleksibel karena bisa kapan saja."* (Student 4, Interview, 2024)

These statements demonstrate that while e-learning fosters student independence, it is still used in a blended way with traditional learning at MAN Kisaran.

Accessibility

One of the major strengths of e-learning is the ease of access to learning resources, which are distributed via the internet, offering far broader availability compared to the limitations of conventional resource distribution. From classroom observations and interviews, accessibility levels at MAN Kisaran are relatively good but still depend on internet stability. A student said:

> *"Kalau sinyal bagus, semuanya lancar. Tapi kalau jaringan lambat, kami kadang kesulitan mengakses materi."* (Student 3, Interview, 2024)

Teachers also observed that while most students have personal devices, some still face challenges:

> *"Sebagian siswa cuma punya ponsel, bukan laptop. Jadi kalau mengerjakan tugas yang butuh layar besar, agak sulit."* (Teacher 5, Interview, 2024)

Enrichment

Enrichment refers to activities that go beyond the standard curriculum, including the use of extended materials, training modules, and digital resources like simulations, streaming videos, and animations. A teacher explained:

> *"Kami menambahkan materi pendukung seperti video atau modul digital supaya siswa lebih mudah memahami pelajaran. Biasanya mereka lebih antusias kalau materi disajikan dengan cara menarik."* (Teacher 3, Interview, 2024)

Classroom observations also showed that students were more engaged during lessons involving interactive quizzes or video materials, reducing boredom and increasing comprehension.

The principles of e-learning are as follows

Interaction is a key element that contributes significantly to the success of the learning process. According to Rusman (2021:264), interaction in the context of e-learning is the ability to communicate with others who are engaging with the same subject or platform. Within educational settings, interaction encompasses both peer-to-peer and learner-to-instructor communication. What sets e-learning apart from traditional computer-based instruction (CBI) is that learners are not simply interacting with machines but are engaging with real people, often from different locations and possibly at different times. This human interaction enhances both interpersonal and content-based engagement, as learners can assist one another in understanding materials through dialogue. Such interaction fosters deeper learning experiences that cannot be achieved solely through media tools. Based on interview and observation data, interaction within the e-learning system at MAN Kisaran is conditional. This means that when direct interaction is essential, in-person classroom learning is conducted; otherwise, lessons are accessible through the designated e-learning website. The interactive elements of e-learning include instructional materials, Q&A sessions, and exercises. The results of these activities are evaluated via the e-learning system, allowing teachers to identify and support students who may still struggle with certain content.

Usability in an e-learning system refers to the ease with which students can navigate and use the platform. It is guided by two main principles: consistency and simplicity. The goal is to ensure that students encounter a straightforward and user-friendly environment that facilitates learning without unnecessary complications in accessing content or completing tasks. According to observations and interviews, the usability of the e-learning system at MAN Kisaran is considered satisfactory. This is evident in how efficiently school exams are conducted, as assessment results are immediately available and grading time is significantly

reduced. Additionally, e-learning supports both teacher and student development. Initially, some educators lacked technical proficiency, but with the support of IT staff, they have improved their digital skills. Another benefit is the reduced use of paper during examinations, as assessments are conducted through the e-learning application, making the process more efficient and environmentally friendly.

Relevance in e-learning is determined by the accuracy and accessibility of the content presented. All information shared through the platform should be directly related to the learning objectives to prevent confusion and support deeper understanding. Delivering the right content in the right context and at the appropriate time requires careful content design and strategic presentation. This includes aligning materials with the flow of instruction and ensuring easy navigation. Based on the findings from observations and interviews, the content in MAN Kisaran's e-learning system is aligned with the curriculum and core competencies of each subject. Each semester, the program ensures that the required materials and content are completed in a timely manner. Additionally, the website's design and interface make it easier for students to engage with the content, sparking their interest in exploring and learning through the platform.

Factors Supporting E-learning-Based Learning Innovation at MAN Kisaran

Adequate Accessibility to the E-learning Website

At MAN Kisaran, the innovation of e-learning is supported by more enabling factors than obstacles. One of the most critical supporting elements is the accessibility of the e-learning website interface, which plays a vital role in shaping an effective digital learning environment. Observations and interviews revealed that the website's interface is user-friendly and easy for students to navigate. It also assists teachers in monitoring and evaluating students' progress. The online platform provides a variety of integrated features to facilitate learning, such as discussion forums, live chat functions, digital assessments, and administrative tools.

Adequate E-learning Training

Training for both students and teachers is another essential component that supports the successful implementation of e-learning innovations at MAN Kisaran. The school ensures that learning runs as planned by offering structured training sessions. Interview results indicate that this training benefits participants by enhancing their familiarity with the system. MAN Kisaran has been consistent in its support—starting with initial socialization and continuing with hands-on training. These initiatives help educators develop the necessary competencies to operate and teach through digital tools. Teachers also have the opportunity to learn from one another, with more experienced individuals mentoring those who are still adapting. Enhancing teachers' professional development through workshops, MGMP forums, seminars, and training sessions ensures that they are well-prepared to apply their learning in the classroom. This continued support strengthens the role of e-learning in improving educational quality.

Adequate Human Resources

In addition to formal training, the presence of competent human resources significantly supports the e-learning initiative at MAN Kisaran. Based on the data gathered, both teachers and students possess the necessary skills to utilize digital tools effectively. The teachers, in particular, demonstrate strong capabilities in managing ICT-based education, which directly supports the e-learning system. Both students and educators are actively involved in the implementation process, with teachers showing proficiency in navigating the internet and integrating it into their teaching strategies. These human resources are critical in maintaining and improving the digital learning experience at the school.

Factors Hindering E-learning-based Learning Innovation at MAN Kisaran

While e-learning innovation at MAN Kisaran has shown promise, the implementation process is not without difficulties. Several challenges have been identified that hinder the seamless application of the system. One of the main concerns is the infrastructure and availability of learning facilities. Interviews with school personnel indicated that infrastructure shortcomings pose a barrier to optimizing the e-learning system. Specifically, internet connectivity remains a key issue.

The school's internet infrastructure, while supportive in theory, faces practical obstacles. Firstly, unstable internet access can prevent students from connecting to the network, which disrupts learning activities and limits the platform's effectiveness. Additionally, server issues, including unexpected outages during sessions, further complicate the process. Secondly, the limited number of computers in the school's laboratory means that many students must rely on personal devices like smartphones or laptops to access lessons. Thirdly, power outages occasionally affect the school, interrupting the continuity of online learning sessions. These infrastructure-related issues highlight the need for ongoing improvements to ensure that the e-learning system functions effectively and supports educational goals.

CONCLUSIONS

This study set out to analyze how e-learning is implemented as a technology-based educational innovation at MAN Kisaran. The findings clearly address this objective by showing how the school integrates digital tools into daily learning activities, highlighting both its strengths and the areas that still need improvement. The research shows that e-learning at MAN Kisaran works effectively through its main characteristics: interactivity, independence, accessibility, and enrichment. Interactive features allow students and teachers to communicate more easily, whether through chat groups, discussion forums, or direct messages on the platform. Students also appreciate the independence e-learning offers, as they can review materials anytime and at their own pace. At the same time, enrichment activities—such as digital quizzes, video-based lessons, and interactive exercises—make the learning process more engaging and meaningful. The findings also confirm that the implementation reflects the principles of e-learning: interaction, usability, and relevance. Teachers and students interact dynamically, both in real time and asynchronously, creating a more flexible learning environment. Usability has improved thanks to training programs that make the platform easier to use for everyone involved. Meanwhile, the materials provided on the platform remain relevant because they are aligned with the curriculum and core competencies for each subject. However, several challenges still exist. Issues such as unstable internet connections, limited infrastructure, and differences in digital skills among teachers sometimes hinder the full potential of the platform. These challenges suggest that while e-learning has become a strong foundation for innovation at MAN Kisaran, ongoing support and investment are still needed—especially in upgrading facilities, improving internet stability, and providing continuous professional development for teachers. The findings show that the study's objective has been met. By understanding how e-learning is practiced, what makes it effective, and what barriers still need to be addressed, this research offers valuable insights for MAN Kisaran and other schools aiming to integrate technology in meaningful and sustainable ways. With consistent support and continuous improvement, e-learning has the potential to become an even stronger tool for enhancing teaching and learning in the digital era..

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