DEVELOPMENT OF E-LEARNING AS A DISTANCE LEARNING PLATFORM IN THE ERA OF INDUSTRY 4.0

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Abstract

Industry 4.0 has significantly transformed the educational landscape by promoting the adoption of digital technologies within le arning environments. A notable impact of this industrial revolution is the introduction of technology-assisted learning innovations, such as digital media, resources, and educational platforms. E-learning has emerged as a prominent instructional platform in the Industry 4.0 educational era, as it facilitates remote learning and fosters innovation in teaching and learning processes. This study aims to develop and assess the practicality of a website-based e-learning product for SMP 1 Barru, Indonesia. The research employs the 4D model, which consists of the stages: define, design, develop, and disseminate. The study commences with an analysis of students, the learning process, and educational tools to identify core learning issues. The analysis, conducted through observations and interviews, revealed that students require digital learning tools that are accessible anytime and anywhere to support educational activities, such as e-learning. The subsequent phase involves the design and development of the e-learning platform by creating a prototype using a website builder. The third stage includes developing the e-learning product by initially evaluating the validity of its content and materials with the involvement of two experts in educational products and e-learning. Expert validation yielded an average score of 3.92 out of a maximum score of 4.0, indicating that the product is deemed suitable for use, particularly for remote learning. The product was then tested for practicality with a small group using a practicality questionnaire. The respondents included two teachers (one senior and one junior) and six students selected based on low, medium, and high achievement levels. The average total score of the practicality questionnaire was 3.30 out of a maximum score of 4.0, suggesting that the product is practical for supporting the learning process. The results of expert validation and practicality testing highlight the potential of e-learning as a practical solution for enhancing education in the digital era. However, it requires ongoing maintenance and content development to ensure sustainability and improve the learning experience

Keywords: E-learning, revolusi 4.0, learning

1 INTRODUCTION

The rapid and proactive advancement of information technology has emerged as a key driving factor in the 4.0. The 4.0 Industrial Revolution represents an advanced phase following the 4.0 Revolution, characterized by the integration of digital technology, artificial intelligence, the Internet of Things (IoT), and various other technological innovations into manufacturing processes and industrial sectors (Annisa, 2021; Haqqi & Wijayati, 2019; Wandini & Lubis, 2021). These innovations have transformed all aspects of human life, including education.

The 4.0 Industrial Revolution has had a significant impact on the education sector by bringing about substantial changes in teaching and learning methodologies (Muley, 2022; Ostrander, 2015; Pandey, 2023; Sangole, Desai, & Jain, 2022). A primary effect is the shift towards more intensive use of digital technology in education. Schools, universities, and other educational institutions have increasingly adopted digital technology tools and platforms, such as computers, tablets, and educational software, to support the learning process.

The field of education is one of the areas significantly impacted by the innovations of the Fourth Industrial Revolution (Mas, Daud, & Djafri, 2022; Timbi-Sisalima, Sánchez-Gordón, Hilera-Gonzalez, & Otón-Tortosa, 2022). Junior High Schools (SMP) in an era of rapidly evolving technology face several challenges that must be addressed to effectively conduct education within a digital environment. Additionally, digital skills have become a crucial factor in this technological era. Both teachers and students need to be equipped with adequate digital skills to operate technology effectively. (Omar, Ruzaidi, Mohd-Puad, & Jusoh, 2023; Riska et al., 2023; Syahputra, Afandi, Dalimunthe, & Widyanto, 2022). E-learning, or electronic learning, is an approach to education that utilizes electronic devices over networks or online platforms. Through e-learning, teaching and learning processes can be accessed by anyone, anytime, and anywhere (Molefi, Ayanwale, Fernando, & Nicosia, 2023; Paquette & Milligan, 2023). Many schools have utilized e-learning platforms to integrate technology into the learning process (Agnes Agustina, Desi Tamala, Lisna Yanti, Maulia Sari, & Laurensia Masri Perangin Angin, 2023; Husain & Basri, 2021).

This study aims to develop e-learning as a remote learning platform. Additionally, the study seeks to assess the feasibility and practicality of e-learning products for Junior High School

students in Barru Regency. The findings of this research are expected to serve as a reference for considerations in the development of e-learning within the educational sector.

2 METHODOLOGY

This research design employs the Research and Development (RnD) method to develop an e-learning product specifically for junior high schools. The development process follows the 4D model, which includes Define (needs assessment), Design (design planning), Develop (product development), and Disseminate (dissemination) (Thiagarajan, 1974). The subjects of the research are teachers and students from SMPN Barru, South Sulawesi Province, totaling 102 participants, consisting of 2 teachers and 100 students from heterogeneous backgrounds. The data collection techniques used were observation, interviews, and questionnaires.

3 FINDINGS AND DISCUSSION

This section addresses the objectives of the research and development conducted, which is to produce an E-learning product for students at SMPN 1 Barru, South Sulawesi Province. Consequently, the subsections of this topic will be explained in detail according to the research and development stages outlined in the 4-D model.

3.1 E-Learning Development Phases

The first section presents the results of the E-learning product development. The development process consists of four stages: define, design, develop, and disseminate. These four stages will be elaborated in detail as follows.Sub-subsection: Guidelines for Abbreviations and Acronyms

3.1.1 Define

In the Define phase, a needs assessment is conducted for SMPN 1 Barru, focusing on aspects such as student backgrounds, instructional strategies, learning resources, and academic performance. Instruction at SMPN 1 Barru is primarily face-to-face but faces challenges in material accessibility and relevance. Limited textbooks and inflexible schedules, worsened during the COVID-19 pandemic, hinder effective learning. The curriculum materials, while based on national standards, often lack cultural relevance and fail to align with the local context, highlighting the need for supplementary, context-specific resources to address the educational needs of Barru students.

3.1.2 Design

In this phase, a detailed draft of the web-based e-learning product is developed. The draft comprises two primary components: a storyboard created for simulation in Macromedia Flash format, and a specific storyboard for the web-based learning media. The analysis of website features includes key elements such as Home, Login, Courses, Lessons, and Contact. This design is comprehensively detailed in Table 1, which illustrates the proposed layout and functionality of the e-learning product.

Table 1 E-learning Features

Feature	Description
Home	The main page of the website.
Login	Provides access to user accounts and manages personal information.
Courses	Contains a list of classes.
Lesson	Access to learning materials, including modules, videos, or relevant texts.
Contact	Provides contact information or the address of the school.

The hosting service utilized is SchooLearn, with the domain being www.schoolearn.my.id. The development of instructional materials includes a syllabus and modules for each subject area, which consists of Religious Education and Character Development, Citizenship Education, Indonesian Language, English Language, Mathematics, Science, Social Studies, Cultural Arts, Physical Education, Sports and Health, and Information and Communication TechnologyThe design of the interface is illustrated in Figure 1.

Figure 1 E-learning Dashbor

On the user page, which contains student profile data, the information has been connected and synchronized with the school management information system. As a result, there is no need for redundant data entry into the e-learning system. Additionally, the username and password required to access this page have been synchronized with the students' personal data. For illustration, an example of the user page interface of the e-learning website is provided in Figure2. This entire process is designed to enhance the user experience within the online learning environment.

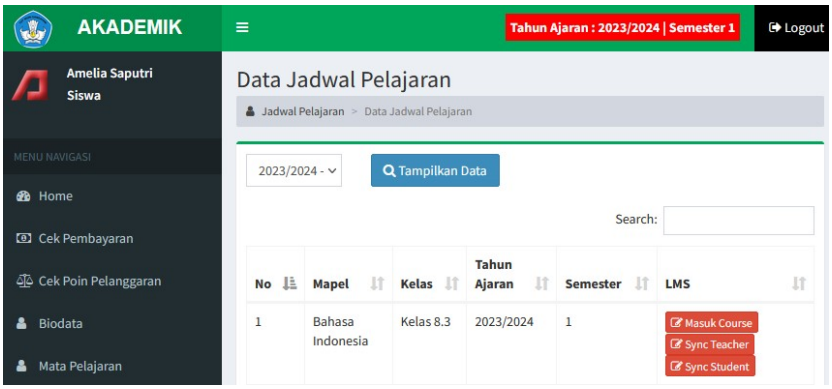

Figure 2 Student E-Learning

3.1.3 Development

The validation process is a critical step in ensuring the effectiveness and feasibility of the developed product. This validation process involves media experts, content specialists, and educational practitioners, with the objective of assessing the quality and relevance of the developed and presented product. The evaluation results provide a holistic overview of the material aspects, media aspects, and practical aspects of the learning experience. By involving experts in the validation process, it is ensured that the developed e-learning platform not only meets academic standards but also accommodates current technological advancements and educational curriculum requirements. The assessment results are then categorized into four levels: highly feasible, feasible, not feasible, and highly infeasible. The validation scores are presented in Table 2.

Table 2 Validation Result

Aspect	Average	Maximum Score	Category
Content			
Clarity of content	3,25	4,00	Suitable
Clarity of information and illustrations	3.25	4,00	Suitable
Coherence of content/test questions	4.00	4,00	Very Suitable
Clarity of language used	3,25	4,00	Suitable
Depth of learning content	3.00	4,00	Suitable
Media			
Website appearance	3,25	4,00	Suitable
Attractiveness	3,00	4,00	Suitable
Interactivity	3.25	4,00	Suitable
Ease of use	3.25	4,00	Suitable
Practicality in Learning			
Alignment of content with basic competencies	4.00	4,00	Very Suitable
Clarity of educational videos	3.25	4,00	Suitable
Relevance of learning content	4,00	4,00	Very Suitable
Ease of control and evaluation	3,25	4,00	Suitable
Total	**3.38**		**Suitable**

The E-Learning product developed for SMP 1 Barru was validated by experts, receiving an overall score of 3.38 out of 4.0, classifying it as "feasible" for use in supporting learning. Key aspects, such as material clarity and information presentation, received scores of 3.25, indicating the product's effectiveness in facilitating student understanding. Additionally, the language used was rated highly feasible, ensuring that the content is accessible to students. The media aspect, particularly the website design, was also rated feasible and attractive, highlighting its potential to enhance student motivation and engagement through its aesthetic and creative interface.

Field testing was conducted concurrently across all classes. Data on student responses were collected through questionnaires and categorized into four Likert scale levels: excellent, good, fair, and poor. The results of the student questionnaires are presented in Table 3.

Table 3 Description of Student Responses

Aspect	Average	Maximum	Category
Ease of use	3.25	4,00	Good
Clarity of information and instructional guidance	3.25	4,00	Good
Encouragement of learning motivation	3.25	4,00	Good
Promotion of independent learning	4.00	4,00	Very Good
Enhancement of student understanding	3.25	4,00	Good
Total	3,50	4.00	Good

Student responses to the developed E-Learning product were positive, with an average score of 3.50 out of a maximum of 4.00. The aspect included by: 1) ease of use, 2) clarity of information and instructional guidance, encouragement of learning motivation, 3) promotion of independent learning, and 4) enhancement of student understanding

3.1.4 Disseminate

The dissemination process utilizes various communication channels, including social media, as well as meetings between school authorities, teachers, and parents. This approach aims to foster a deep understanding of the developed e-learning system, stimulate interest and participation, and build support from the entire student community to enhance the learning experience in this high-tech era.

4 CONCLUSION

The E-learning product developed has been proven to be feasible, practical, and engaging based on expert evaluations and field tests. This demonstrates the significant potential of this product as an effective tool to support student learning at SMP 1 Barru. However, it is essential to note that technology requires regular maintenance. Maintenance is necessary to ensure the platform remains optimal, avoids performance degradation, and can accommodate the evolving needs of students and technological advancements. Additionally, continuous improvement and development of the content are needed to provide more varied learning experiences.

ACKNOWLEDGEMENTS

Thank you so much for Universitas Terbuka that given me financial support for this research and thanks for my family that always support my carier.

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