



DEVELOPMENT OF A LEARNING MANAGEMENT SYSTEM-BASED LEARNING MODULE USER INTERFACE ON JUNIOR HIGH SCHOOL STUDENTS ABILITY TO REMEMBER AND UNDERSTAND CONCEPTS

Atta Mahawisa Aydin^{1*}, Muhibuddin Fadhl²

^{1,2} Teknologi Pendidikan, Universitas Negeri Malang, Kota Malang, Jawa Timur, Indonesia

*Email corresponding author: atta.mahawisa.2201216@students.um.ac.id

Article Info	Abstract
Article history: Received 17-02-2026 Revised 24-02-2026 Accepted 13-03-2026 Published 28-03-2026 How to cite: Aydin, A. M., & Fadhl, M. (2026). Development of a Learning Management System-Based Learning Module User Interface on Junior High School Students Ability to Remember and Understand Concepts. <i>Journal of Facilitating Learning and Improving Performance</i>, 1(1), 22–31. © The Author(s)  This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License	This study aims to develop a User Interface (UI) learning module based on a Learning Management System (LMS) for Social Studies, focusing on Mountain Eruption Mitigation and Sustainable Development Goals (SDGs) at SMP Laboratorium Universitas Negeri Malang. The research was motivated by the needs of digital-native students who are less responsive to conventional media, requiring innovative e-modules with interactive and user-friendly interfaces. The study employed a Research and Development (R&D) approach using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The resulting product is a digital module structured with concept maps, learning objectives, content, and closing sections, complemented by additional learning resources. Expert validation indicated the module was highly feasible, while limited trials revealed positive student responses to both interface design and content. Findings confirm that the LMS-based module with an interactive UI effectively enhances students' ability to recall and understand concepts, providing theoretical contributions to technology-based learning media development and practical benefits for teachers and educational institutions in delivering engaging and effective digital learning materials. Keywords: <i>User Interface; Learning Module; Learning Management System; STEM approach; Conceptual Memory and Understanding Ability.</i>

INTRODUCTION

Education is a conscious and systematic effort to create a learning environment that enables students to develop their potential, including self-control, spiritual knowledge, skills, and intelligence relevant to individual and societal needs (Rahman et al., 2022). Educational effectiveness is characterized by the ability to foster learning independence, a process that encourages students to actively explore and manage their own learning. Along with technological advancements, contemporary education has adopted various innovations, including: *deep learning* which is oriented towards deep understanding through the emotional and cognitive involvement of students (Suwandi et al., 2024). Implementing *deep learning* is an important strategy in realizing the national education goals as stipulated in Law of the Republic of Indonesia No. 20 of 2003, Article 13, paragraph 1, which emphasizes three educational pathways: formal, non-formal, and informal. Formal education, especially elementary education, plays a crucial role in shaping the basic intelligence, personality, noble morals, and skills of students aged 7–15 years.

In the context of basic education, Junior High School (SMP) is a crucial phase because students are required to master increasingly complex material and learning outcomes are the main indicator of achieving educational goals. Gagné (1984) emphasized that learning outcomes should focus on what students learn, not just the learning situation, with five main categories: intellectual skills, verbal information, cognitive strategies, motor skills, and attitudes. Optimizing learning outcomes is greatly influenced by effective learning media. Research by Tiwow et al. (2022) shows that low learning outcomes are often caused by media that are less interesting and insignificant in supporting cognitive achievement. Therefore, the development of *User Interface* (UI) that is intuitive and efficient is one strategy to increase student engagement and learning outcomes.

UI serves as a visual interaction bridge between the user and the system, with the main goal of providing an easy-to-use, efficient, and enjoyable interface (Stone et al., 2005). One educational product that integrates UI is *Learning Management System* (LMS), which is software that facilitates digital interaction between educators and students through material uploading, discussion forums, assignments, and evaluation features (Fitriani, 2020). LMS enables interactive digital learning, while learning modules, as systematic teaching materials, play a role in measuring student learning outcomes (Ananta et al., 2025). Effective module design is characterized by a simple display, clear navigation, and minimal cognitive load, allowing students to control the direction and pace of their learning.

In this study, the development of LMS-based modules was combined with the STEM (STEM) approach. *Science, Technology, Engineering, and Mathematics*) to increase students' interest in learning. The material focuses on mitigating mountainous areas and *Sustainable Development Goals* (SDGs), packaged in the form of an e-module with an intuitive UI. This module not only presents the theoretical concept of volcanic eruptions but also relates it to real-life phenomena, so that students are actively involved in the learning process. Initial observations at UM Laboratory Middle School showed that students tended to be bored with conventional text-based media and

paper quizzes, while they were more enthusiastic about using digital media that suited their characteristics. *digital native* and kinesthetic learning style.

Observations also confirm that digital media with interactive interface designs can improve students' self-confidence, enthusiasm, and learning outcomes. Previous research supports these findings, including Fatmi et al. (2021), who demonstrated the effectiveness of learning modules in improving cognitive learning outcomes, and Dewi & Lestari (2020), who emphasized the role of interactive project-based modules in significantly improving learning outcomes. However, research limitations exist regarding the development of LMS-based module UIs specifically aimed at improving junior high school students' memorization and conceptual understanding.

Based on the research gap, this study was conducted with the title "Development of a Learning Management System-Based Learning Module User Interface for Junior High School Students' Ability to Remember and Understand Concepts", which aims to provide empirical contributions in the development of effective digital learning media that are appropriate to the characteristics of students.

METHODS

This research uses *Research and Development* (R&D) which aims to produce learning products while testing their feasibility and effectiveness in an educational context. According to Sugiyono (2018), development research is not only oriented towards theoretical aspects, but also applied according to field needs. The development model used is ADDIE (*Analysis, Design, Development, Implementation, Evaluation*), which is systematic and oriented towards the learning product design process (Branch, 2009).

Level *Analysis* was done to identify learning needs, student characteristics, and problems that arise in the learning process. Initial observations at UM Laboratory Middle School showed that learning was still dominated by conventional text-based modules, resulting in students feeling bored and lacking enthusiasm. On the other hand, their characteristics as *digital native demand* interactive digital media (Handayani & Fauzi, 2023). These findings form the basis for developing an LMS-based module UI.

Level *Design* formulate learning objectives, material structure, and design the module's appearance and flow. The design focuses on clarity of navigation, visual consistency, and interactivity, with a systematic presentation of the material, complemented by concept maps, illustrations, and activities that support basic information processing.

Level *Development* transform the design into a tangible product in the form of a user-friendly LMS-based module UI. The material is presented digitally, with attention to text readability, font consistency, color usage, and icons that support memorization and conceptual understanding.

Level *Implementation* was done by applying the module to junior high school students. This process involved administering a pre-test to measure initial abilities, using the module in learning, and completing a questionnaire assessing UI perceptions. Afterward, students were given a post-test to assess changes in their abilities.

Level *Evaluation* is to assess the achievement of learning objectives and product quality. Descriptive analysis of pre-test and post-test scores was conducted to

determine improvements in memory and conceptual understanding. The evaluation results serve as the basis for assessing the success of the development and providing recommendations for product improvements.

Thus, the application of the ADDIE model in this study produces an LMS-based module with a structured, interactive UI that suits the characteristics of junior high school students, thus potentially improving learning outcomes, especially in the aspect of the ability to remember and understand concepts.

RESULTS

The results of the development in this research are in the form of a learning module based on *Learning Management System* (LMS) designed to improve students ability to remember and understand concepts. Module development is carried out by integrating learning materials. *Mitigation of Eruption Mountain Areas And Sustainable Development Goals (SDGs)* into LMS-based e-modules using the STEM approach (*Science, Technology, Engineering, and Mathematics*). The module is packaged in the form of a digital flipbook that is uploaded and can be accessed through the LMS, thus supporting learning flexibility. In addition, the module is designed with an intuitive and user-friendly User Interface (UI), thus facilitating navigation, increasing student engagement, and supporting the effectiveness of the learning process. The details of this learning module reflect the integration between STEM-based content, efficient UI design, and the use of the LMS as an interactive digital platform to achieve learning objectives:



Figure 1. Learning Module Cover Design

User Interface design on cover the module was developed to present an attractive visual impression while accurately representing the context of the learning material cover. The module displays titles with clear, easy-to-read typography, along with illustrations of volcanic eruptions as the main visual element that reflects the content. The color, layout, and illustrations are arranged proportionally to create a modern, consistent, and user-friendly appearance for junior high school students. This design

approach serves not only as the module's visual identity but also as a motivational strategy that supports student engagement from the very beginning of interaction with the learning media.

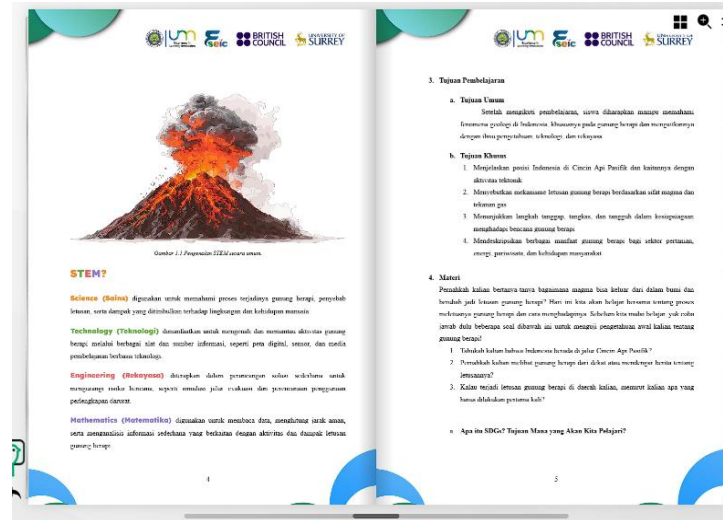


Figure 2. Learning Module Page

User Interface design on the module pages was developed by adding graphic elements to the edges as a visual frame that emphasizes the display structure. Curved elements and color accents were placed consistently at the top, bottom, and sides of the page to create a dynamic impression. The placement of these visual elements was designed so as not to distract students from the main content, but rather to reinforce the aesthetics and order of the display. This approach supports readability, visual consistency, and a more engaging learning experience that is appropriate for the characteristics of junior high school students.



Figure 3. Learning Module Closing Page

User Interface design on the closing page of the module is designed with a clean white background that gives a neutral impression, combined with green-blue color accents to present a fresh and modern feel. The text is displayed centrally with color variations used selectively to emphasize key words, so that the main message is easier for students to grasp and remember. The closing page not only functions as a form of appreciation for student participation in learning, but also as a motivational tool that encourages reflection on the importance of understanding and preserving nature.

Furthermore, the module content is structured in harmony with a simple yet consistent design, ensuring a systematic and easy-to-understand presentation. The modules serve not only as information providers but also as interactive activities in the form of practice questions, reflections, and discussion forums. This integration of content and design supports improved memorization and conceptual understanding, while also strengthening motivational aspects that encourage active student engagement in the learning process.

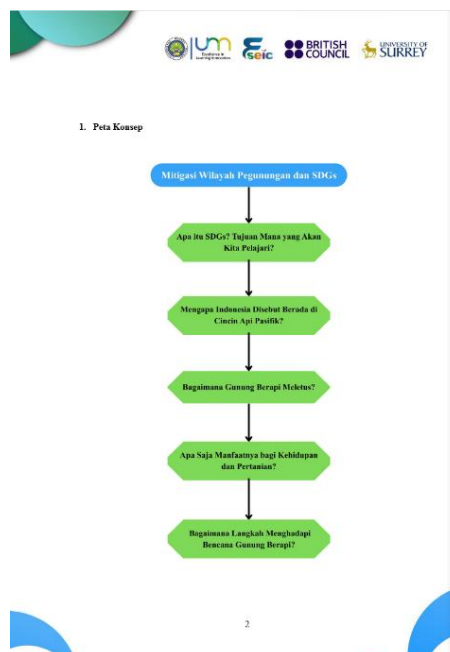


Figure 4. Concept

Based on the concept map, this learning module presents core material regarding the phenomenon of volcanic eruptions, then relates it to the objectives *Sustainable Development Goals*. The presentation focuses on relevant SDGs and concludes with a discussion of eruption disaster mitigation measures. The flow of the presentation is designed to encourage students to comprehensively understand natural phenomena, connect them to the sustainable development agenda, and prepare appropriate mitigation measures.

This module was developed to provide a basic, integrated understanding, so that students not only understand the volcanic eruption process but also examine its relationship to sustainable development goals and the urgency of disaster preparedness. This approach emphasizes the interconnectedness of conceptual,

contextual, and applied aspects, so that the module serves as a learning tool that supports the achievement of cognitive competencies while fostering environmental and social awareness.



Figure 5. Learning Module Content

The learning module developed in this research focuses on basic material regarding volcanic eruptions which is presented with simple explanations, then integrated with the STEM (Science and Technology) approach. *Science, Technology, Engineering, Mathematics*) And *Sustainable Development Goals* (SDGs). This integration demonstrates how science is used to understand eruption processes, technology is utilized in monitoring volcanic activity, engineering is applied to design mitigation solutions, and mathematics is used in data analysis and determining safe distances. At the end of the module, additional learning resources are provided in the form of video links that students can access after reading the material. This combination makes the module not only a means of introducing basic natural phenomena but also a learning medium that emphasizes the integration of scientific disciplines in facing and anticipating natural disasters.

Prior to implementation, the module underwent a validation process by media experts, assessing navigation, design, text, images, and performance based on 10 assessment indicators. The quantitative analysis yielded a score of 32 out of 40, placing the module in the highly valid and usable category. Qualitatively, the media experts confirmed that the module met eligibility standards, performed consistently, and required no substantial revisions, making it readily applicable to learning.

The trial phase was conducted on 32 students of class VIII F of SMP Kartika IV-9 Malang. The results of the field test showed a score of 2856 out of a maximum score of

3840. The calculation of the feasibility percentage used the formula $p = \frac{Why?}{PSH} \times 100\%$ resulting in a score of 74%. Based on Sugiyono's (2018) criteria, this achievement falls into the feasible category, so the module is declared suitable for use in the learning process.

The module was then implemented with 32 eighth-grade students at SMP Laboratorium, State University of Malang. Initially, students were given a pretest to gauge their initial understanding of the material on mountain mitigation and the SDGs. The learning process then took place using the module for 10–15 minutes, allowing students to engage directly in targeted learning activities aligned with the objectives of the media development.

As a follow-up, students are given posttest to assess the improvement in learning outcomes. The analysis shows an increase in the average score from 87.6 in *pretest* to 88.4 on *posttest* the N-Gain calculation yielded a score of 0.77, which is considered high. This finding indicates that the LMS-based learning module with the developed UI design is effective in improving students' ability to remember and understand concepts.

Table 1. Pre-test and Post-test Results

	N	Minimum	Maximum	Mean	Median	Std. Deviation
<i>Pre-test</i>	32	43,3	100	87,6	90,0	11,4
<i>Post-test</i>	32	0,00	100	88,4	100	26,4

DISCUSSION

This study confirms that the development of a Learning Management System (LMS)-based learning module with an interactive User Interface (UI) contributes significantly to enhancing students ability to recall and understand concepts. These findings are consistent with Fatmi et al. (2021), who demonstrated that interactive modules have a substantial impact on cognitive learning outcomes. Similarly, Dewi & Lestari (2020) emphasized that project-based e-modules foster active student engagement, thereby leading to consistent improvements in learning achievement. Fitriani (2020) further highlighted that LMS platforms provide flexible digital interaction spaces between teachers and students, supported by user-friendly interfaces. Taken together, these studies reinforce the conclusion that an intuitive and consistent UI within LMS environments functions not only as an information delivery tool but also as a facilitator of students' cognitive and emotional engagement in learning.

The practical implication of this research lies in the availability of a digital module development model that teachers can adopt to improve the quality of instruction in junior high schools. Such modules serve as alternative learning media tailored to the characteristics of digital-native students, while simultaneously supporting the attainment of fundamental cognitive competencies. The theoretical implication, on the other hand, is the contribution to the body of knowledge in educational technology, particularly in the study of UI design as a determinant of media effectiveness. This research opens avenues for further investigation into which specific UI elements most strongly influence learning outcomes, thereby enriching instructional design theory and advancing the broader goal of improving educational quality in the digital era.

CONCLUSION

This development research produces a learning module based on *Learning Management System* (LMS) with design *User Interface* Interactive and user-friendly UI. Expert validation and limited trials indicate that the module is suitable for use in learning contexts. The results indicate that the use of the module can support the improvement of students' ability to remember and understand concepts, in line with the two categories of learning outcomes proposed by Gagné (1984). These findings confirm that effective UI design in digital modules is an important factor in supporting the learning process and achieving basic cognitive abilities.

However, this study has limitations. The trial was conducted in only one class with a limited number of students, so the results cannot be widely generalized. Furthermore, the research phase was limited to expert validation and limited trials, without including long-term evaluation or product dissemination. Therefore, further research is recommended to expand the scope of the trial to more classes or schools and continue the development phase to include long-term evaluation. Future research could also examine the specific contribution of each UI component within the module, thereby identifying the most effective elements in supporting students' memorization and conceptual understanding.

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