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Optimization of Moodle-based Learning Management System in Sociology Learning: A Differentiated Approach Analysis

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ABSTRACT

Sociology learning requires critical, analytical, and reflective thinking, which is often not fully supported by traditional teaching methods. Differentiated learning offers a way to address diverse student needs, and Moodle, as a Learning Management System (LMS), provides a potential platform to support this approach. This study aims to examine how Moodle can optimize differentiated learning in Sociology subjects. Using a quantitative descriptive method, data were collected from 176 students of grades XI and XII majoring in Sociology at SMAN 1 Jogonalan, selected through simple random sampling. The instrument was an online questionnaire with closed-ended Likert scale items and open-ended questions to explore challenges. Descriptive statistical analysis revealed that 48.30% of students rated their Moodle use as high, 26.14% as medium, and 25.57% as low. Students perceived Moodle as useful in increasing learning flexibility, supporting concept understanding, and accommodating individual learning styles. However, limitations were also identified, including insufficient infrastructure and a lack of digital proficiency. The study concludes that Moodle has the potential to strengthen differentiated learning in Sociology. The findings contribute to the development of technology-based learning strategies in secondary education and underscore the need for additional support and training to facilitate effective LMS implementation.

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Keywords:
differentiated approach;learning management system; moodle; sociology learning

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INTRODUCTION

The era of technological disruption has brought significant changes in various fields, including education, which is increasingly digitized through Ed-Tech innovation or educational technology (Nugraha et al., 2021; Salsabila et al., 2021). Ed-Tech is designed to support learning and improve performance through the effective design, utilization, and management of technology-based resources, along with the development of the internet as the primary source of information and new standards in web-based learning (Nisrokha, 2020; Bali et al., 2022; Goyal et al., 2023). The rapid development of technology demands learning that is flexible, innovative, engaging, and empowers learners (Lasmawan, 2019; Hontareko, 2021; Widiastuti et al., 2023). This encourages educational institutions to utilize the Learning Management System (LMS) as a tool to support the student learning process (Mpungose & Khoza, 2020; Al-Sharhan et al., 2019). Various Learning Management Systems (LMS) serve to develop, manage, and distribute digital resources, bridging traditional teaching methods with digital technology, while providing personalized online learning opportunities for students (Gamage et al., 2022; Aljawarneh et al., 2023). The Learning Management System (LMS) has become the primary solution that enables a more flexible, interactive, and structured learning system (Putri et al., 2022; Marmoah & Sukmawati, 2024; Muzaki et al., 2025).

One of the most widely used LMSs in education is Moodle, which has evolved into a global learning platform. (Al-Azawei, 2019; Fatmawati, 2019; Zabolotniaia et al., 2020). Moodle is an open-source Learning Management System (LMS) platform developed to provide a unified, reliable, and secure solution for educators, administrators, and learners to build a structured and effective learning environment, and is popular among universities due to its high flexibility and low implementation costs (Bojiah, 2022; Olugbade et al., 2023). The Moodle platform has proven effective as a learning tool due to its ability to present content interactively, support the use of multimedia, and provide various opportunities for collaboration, following instructions, giving each other feedback, and reinforcing understanding of the material that has been learned (Aikina & Bolsunovskaya, 2020). As a popular LMS, Moodle provides flexible learning that supports individual learning pace, enhances student independence and academic achievement, while offering a variety of materials such as videos and texts to aid understanding of complex information, and allows teachers to monitor and refine the learning process through tracking student activity to match their needs, interests and abilities (Mlotshwa et al., 2020; Ristić et al., 2023; Mohammed et al., 2025). According to the latest data summarized from Moodle's official statistics, the platform is one of the most popular LMS in the world with 436 million users from 237 countries accessing over 147 thousand sites, and over 50 million courses available. User activity is also very high, as evidenced by 810 million forum posts, 442 million uploaded resources, and nearly 10 billion quiz questions, reflecting the wide utilization of assessment features in supporting the learning process (Moodle, 2022). In its development, LMS such as Moodle has grown rapidly and become a solution to the digitalization of education. However, its implementation still faces various obstacles, such as limited infrastructure, uneven internet access, and a lack of teacher understanding of the features offered, which are the main challenges in its implementation (Rochmanto et al., 2022; Akram & Cut, 2023). In learning sociology, this challenge is even more complex because the subject requires an in-depth understanding of social, cultural, and community relations. Therefore, the application of Moodle needs to be tailored to the needs of students to make it more effective and relevant (Marpaung et al., 2021; Hidayati & Maslikhah, 2022).

In addressing the above challenges, Moodle can be optimized as a key platform that supports innovative learning strategies through differentiated learning approaches (Palahicky, 2015; Burgstrom, 2017). Tomlinson (2017) stated that in differentiated learning, students' diversity is seen from three aspects, namely, interest (related to things that students like, which can encourage the spirit of learning); learning readiness (students' ability and knowledge in achieving learning goals); and learning profile (the most suitable way of learning for students, such as learning visually, auditory, kinesthetic, or through individual or group work). Differentiated learning can be done through four strategies: content, process, product, and learning environment. Content relates to the material that students learn, process includes how students process information, product is the result of learning, and learning environment includes the atmosphere and facilities that support learning activities. To support this strategy, digital platforms such as Moodle can be utilized, as they provide access to structured materials, online discussion spaces, and collaborative activities that cater to various learning styles. Moodle also facilitates teachers in designing relevant and interactive learning experiences, including in the subject of Sociology, thereby enabling a flexible learning experience that suits the needs of students (Herayanti et al., 2017; Hekmatyar et al., 2024; Usman et al., 2024). Mahmud et al. (2021) found that Moodle-based e-learning media is highly feasible for use in the sociology learning process, as confirmed by validation from media experts and material experts. Meanwhile, Palahicky (2015) emphasizes that the LMS can help teachers achieve differentiated learning, but it also demands high flexibility in teaching, as teachers must continuously adapt materials to meet the individual needs of students. On the other hand, Jamaluddin et al. (2022) design differentiated learning using Moodle LMS with a flowchart approach, which connects various forms of

content, such as videos, quizzes, and reading assignments, to enhance students' learning experience. Previous studies have primarily examined the technical functions and general application of Moodle-based Learning Management Systems (LMS) in classroom settings. However, limited attention has been given to its pedagogical optimization in Sociology learning, which demands the cultivation of critical, analytical, and reflective thinking. In many cases, Moodle is still utilized mainly as a content repository, with minimal integration of interactive activities or differentiated strategies to address diverse student needs. This study addresses this gap by exploring Moodle not only as a technological platform but also as a medium for implementing differentiated learning in Sociology education. The novelty lies in its subject-specific focus, offering evidence-based recommendations for enhancing LMS use in disciplines that require deep cognitive engagement and varied instructional approaches.

METHOD

This study employs a quantitative descriptive survey approach to objectively examine phenomena through numerical data without aiming for generalization. The method emphasizes presenting actual conditions as they occur, enabling the observation of real and measurable situations in educational settings (Creswell & Creswell, 2022). The survey method was chosen to systematically gather and interpret data on students' perceptions of Moodle in supporting differentiated learning in Sociology classes, focusing on identifying both its perceived benefits and the challenges encountered in its use. The population in this study consisted of 314 students enrolled in grade XI and XII Sociology specialization classes at SMAN 1 Jogonalan. The sample was selected using simple random sampling, resulting in 176 students who participated in the study. Data collection was conducted using a Google Forms-based questionnaire that contained both closed-ended questions, which utilized a Likert scale, and open-ended questions. The Likert-scale items were designed to measure students' judgments regarding Moodle's functionality, accessibility, and usefulness in differentiated learning, while the open-ended items aimed to explore practical issues and difficulties. The development of questionnaire items referred to the indicators is arranged in Table 1.

Table 1. Research Indicator Outlines

Aspect	Indicator
Effectiveness of LMS in Sociology Learning	Understanding and Mastery of Materials
	Student Motivation and Participation
	Quality and Access of Materials
	Learning Evaluation and Feedback
	Interaction and Ease of Tasks
	Reflection on the LMS
The Role of LMS in Differentiated Learning	Adaptation to Learning Styles and Formats
	Support for Differences in Understanding and Learning Focus
	Differentiation of Pace and Tasks
	Feedback and Progress Monitoring
	Increased Confidence and Flexibility of Access
Comparison of Moodle LMS with the Lecture Method	Appeal, Motivation, and Confidence
	Independence and Flexibility of Learning
	Understanding and Mastery of Materials
	Reflection on Comparison of Methods
	Interaction and Ease of Tasks
	Access and Technology Constraints

Aspect	Indicator
Challenges and Barriers to LMS Implementation	Student Participation and Engagement
	Training Needs and Adaptations
	Instruction and Comprehension of Materials
	Flexibility and Learning Disabilities
	Time Management and Self-Regulation

To ensure that the instrument met academic standards, it was tested in two phases. First, expert judgment was conducted by a Sociology lecturer from Yogyakarta State University to review the item clarity, grammar, and content alignment with the research objective (Sukardi, 2021). Second, empirical testing was conducted using SPSS to examine the validity and reliability of the instrument (Field, 2018). Validity was assessed using Pearson's correlation between item scores and the total score, and the majority of items showed significance at $p < 0.05$, indicating they were valid. Reliability testing was conducted using Cronbach's Alpha, and the resulting coefficient indicated that the instrument had strong internal consistency.

The survey results were processed using descriptive statistics to identify both the benefits perceived by students and the challenges they face when using the platform. The collected data were then analyzed using descriptive statistics. The results of the closed-ended items were presented in tables and graphs, accompanied by narrative explanations that helped identify patterns in student responses (Pallant, 2020). Meanwhile, the open-ended responses were grouped and summarized to identify common themes related to the challenges students experienced. This analysis provides a comprehensive picture of the extent to which Moodle was successfully used to implement differentiated learning in Sociology. Based on these findings, the study provides practical suggestions for enhancing the design and implementation of Moodle-based learning activities in secondary schools.

RESULTS AND DISCUSSION

The use of Moodle-based Learning Management System (LMS) is increasingly becoming an important part of the learning process at various levels of education (Pradja et al., 2022). This platform provides easy access to materials, facilitates interaction between teachers and students, and offers various features that support the diversity of learning styles. In the context of sociology, where learning demands different approaches according to individual student needs, optimal LMS utilization is crucial. Therefore, it is essential to assess the extent to which Moodle LMS is implemented among students, in order to determine the level of utilization and its effectiveness in supporting differentiated learning. Based on the descriptive statistical analysis conducted on data from 176 respondents, the following classification table illustrates the categorization of the Moodle LMS implementation level based on a specific score range. Table 2 is used to categorize respondents into three main categories: low, medium, and high.

Table 2. Categorization of Implementation of Moodle LMS Usage

Interval	Frequency	Percentage	Description
114 – 138	45	25.57%	Low
139 – 145	46	26.14%	Moderate
146 - 190	85	48.30%	High

Table 2 shows that the respondents' implementation of Moodle LMS is divided into three different utilization level categories. A total of 48.30% of respondents are in the high category, which reflects the optimal utilization of Moodle LMS in supporting online learning. This category indicates that most respondents have utilized the platform's main features to the fullest, including material access, discussion forum, and assignment collection. This indicates that respondents in this category possess good digital literacy and can effectively adapt technology-based learning approaches, which support the principle of differentiated learning by providing flexibility and responsiveness to individual learning needs.

However, 26.14% of respondents fall into the moderate category, indicating that although they have utilized the Moodle LMS in the learning process, their use is still not optimal. Although there is already a basic understanding of this platform, the intensity and quality of its utilization are not optimal. The use of existing features is still limited in meeting a variety of student learning needs, both in terms of material variations and assessment forms. 25.57% of respondents fall into the low category, indicating that the utilization of the Moodle LMS among them remains limited. Constraints include incomplete material, difficulty in understanding the material independently, and a lack of interactivity. Overall, the findings suggest that the implementation of Moodle LMS has great potential in supporting differentiated learning, especially for respondents in the high category. However, the existing gaps, especially in the medium and low categories, indicate the need for further evaluation and improvement. Improving the quality of materials, providing more interactive features, and offering more in-depth training for teachers and students are needed to optimize the utilization of the LMS. With these steps, the Moodle LMS can function optimally as an online learning medium that is more adaptive, inclusive, and responsive to diverse learning needs.

Al-Azawei et al. (2017) demonstrate that the success of LMS implementation is significantly influenced by internal user factors, including motivation, digital literacy, and perception of technology, as well as external factors such as institutional support and the quality of learning content. The Technology Acceptance Model (TAM) theory, developed by Davis (1989), also explains that perceived usefulness and perceived ease of use are key factors in determining the extent to which technology will be used effectively in education. In addition, Seluakumaran et al. (2011) suggested that active user engagement in LMS features significantly improves learning outcomes as it supports independent and collaborative learning. Therefore, increasing digital competence and pedagogical understanding in using the LMS are key factors that should be prioritized in the development strategy of Moodle-based online learning.

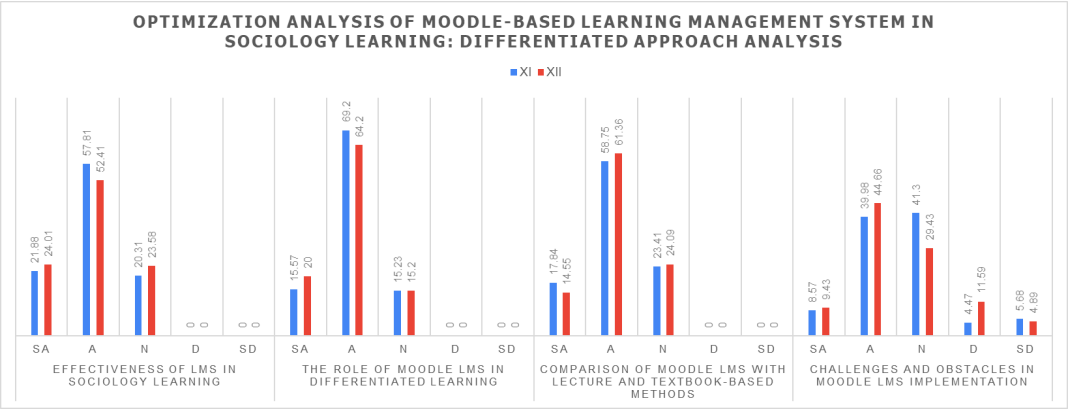

Figure 1. Analysis of Optimization of Moodle-based Learning Management System in Sociology Learning: Differentiated Approach Analysis

Then, the Optimization Analysis of a Moodle-based Learning Management System in Sociology Learning is carried out based on the indicators identified in this study. Based on the findings of this study, the implementation of the Learning Management System (LMS) Moodle in the context of learning exhibits a very constructive trend from various aspects. Regarding the effectiveness of LMS Moodle, the analysis results indicate that most students in both classes XI and XII perceive LMS Moodle as effective in supporting their sociology learning. A total of 57.81% of students in class XI and 52.41% of students in class XII agreed, while 21.88% and 24.01% of students in each class strongly agreed. This indicator includes aspects of concept understanding, learning motivation, material quality, learning evaluation, social interaction, student participation, material repetition, accessibility, feedback, and ease of doing assignments. This percentage indicates that the Moodle LMS has played an important role in supporting more interactive and flexible learning. The adaptive and personalized use of Moodle has been proven effective in improving concept understanding, learning motivation, student participation, and accessibility in online learning (Shchedrina et al., 2021). Nonetheless, around 20% of students still disagree, indicating that there is room for improvement, especially in technical aspects and student engagement. The active involvement of students is crucial, as their direct participation in the learning process facilitates the creation of knowledge (Oguguo et al., 2021). The use of Moodle relies heavily on the active participation of students, as the platform supports out-of-class learning and increases the effectiveness of blended learning models (Shawaqfeh et al., 2020; Widiastuti et al., 2022; Jabar & Wesley, 2025). Student engagement has a significant influence on learning outcomes (Lu, 2020; Teng & Wang, 2021; Hong et al., 2021).

Furthermore, the indicator of the role of the LMS in differentiated learning measures how far the Moodle LMS can facilitate learning that adapts to the needs and characteristics of individual students, such as learning style, level of understanding, task differentiation, learning speed, and the format of materials and feedback. The results were very positive: 69.2% of Grade XI and 64.2% of Grade XII students strongly agreed that the LMS supports differentiated learning, followed by 15.57% and 20% who agreed. This demonstrates that Moodle's features, such as setting the pace of learning and personalizing materials, can accommodate students' individual differences, thereby enabling inclusive and adaptive learning. This aligns with Jabar and Wesley (2025), who stated that Moodle is very useful and easy to use, particularly due to its various features, which facilitate online assignment access, thereby supporting flexible and adaptive learning. The learning management system in Moodle, which provides various resources and settings, strongly supports the implementation of differentiated learning based on students' ability levels (Terletska et al., 2023).

Then, the Moodle LMS Comparison Indicator, using the Lecture or Textbook Method, compares the LMS with traditional learning methods in terms of attractiveness, learning independence, material understanding, flexibility, and learning motivation. Most students showed a preference for using the Moodle LMS. A total of 58.75% of grade XI students and 61.36% of grade XII students agreed that learning with Moodle is better, while 14.55% and 17.84% strongly agreed. This response strengthens the evidence that LMS can enhance the learning experience through a more modern and interactive approach, allowing students to learn independently and flexibly at their own pace. Moodle as an LMS supports modern, interactive learning by enhancing communication, encouraging critical thinking, and providing flexible evaluation and instant feedback to support students' learning independence and efficiency (Bojiah, 2022; Goyal et al., 2023). Using interactive Moodle can improve student development in learning sociology, providing a more in-depth learning experience than conventional methods (Qaddumi & Smith, 2024). Moodle is a solution to the time constraints of conventional methods by providing flexible online learning access, allowing students to understand the material in depth without being bound by time and space (Swastika et al., 2020; Yauma et al., 2020; Goyal et al.,

2023). The use of Moodle shows potential for greater efficiency compared to traditional learning approaches (Jeong & Hwang, 2023).

Although the benefits of the Moodle LMS are quite significant, its implementation is not without challenges. The indicators of challenges faced include internet access, ability to use technology, student participation, training needs, understanding of instructions, and utilization of interactive features. As many as 44.66% of grade XI students and 29.43% of grade XII students stated that they disagreed, indicating that there are still obstacles in implementing the LMS. The percentage of responses indicating "disagree" and "strongly disagree" was also relatively small (around 10-12%), suggesting the diversity of student perceptions of these obstacles, which could be influenced by their respective technical backgrounds and facility support. The effectiveness of using Moodle is highly dependent on the quality of the internet connection, which remains a significant challenge in the education systems of developing countries (Granić & Marangunić, 2019; Ngoc & Phung, 2021; Jabar & Wesley, 2025). Limited internet access can hinder students from participating in class discussions and communication (Xie & Gao, 2020; Arifin et al., 2023). Elsayed and Ghanem (2023) also identified barriers to the use of Moodle, such as limited technical skills and internet access problems, which can be overcome through intensive training, technical support, and improvements to security systems and technology infrastructure.

The results of the analysis indicate that Moodle LMS has made a significant contribution to the effectiveness of sociology learning, particularly in supporting differentiated learning and enhancing adaptive teaching methods that cater to student needs. Moodle facilitates various activities, including access to materials, discussion forums, and online assessments, which align with the principles of modern learning based on social constructivism. This approach emphasizes the importance of social interaction and collaboration in the learning process. The Design Thinking approach has proven effective in designing a more interactive Moodle platform, enhancing the interface quality, and addressing user needs as a whole (Abdillah et al., 2024). Additionally, research indicates that Moodle integration can enhance learning efficiency and foster more active student involvement due to its features that support independent and collaborative learning (Bojiah, 2022). Support from the analytics system in Moodle also plays a crucial role in monitoring student development individually, allowing teachers to provide more targeted and personalized interventions (Olivares et al., 2023). However, the success of this implementation still requires the support of adequate technological infrastructure and increased digital literacy among students and teachers. Therefore, synergy between schools, educators, and stakeholders is essential to ensure the optimal utilization of Moodle as an inclusive, efficient, and meaningful learning tool for sociology. To assess the effectiveness of differentiated learning in the Moodle LMS platform in the Sociology subject, an analysis was conducted with reference to two main approaches as developed by Tomlinson (2017), namely the differentiation aspect (readiness, interest, and learning profile) and the differentiated learning components (content, process, product, and learning environment). This approach is used to assess the extent to which the Moodle LMS can accommodate the needs, interests, and learning characteristics of students individually.

Based on the study of the differentiation aspect, the implementation of Moodle demonstrates significant effectiveness in meeting students' learning needs. Most students stated that the material provided through the LMS is easy to access and can be followed according to their respective abilities and learning speeds. This is reflected in the responses of grade XI students, where 57.81% agreed and 21.88% strongly agreed that the LMS is effective in supporting Sociology learning. In grade XII, 52.41% agreed and 24.01% strongly agreed. This finding confirms that features such as material repetition, independent learning, and flexible access have supported learning needs based on individual readiness. This is in line with Popovic et al. (2018), who explain that the use of Learning Management

Systems (LMS) such as Moodle facilitates interactive and flexible learning in the context of modern education, thus contributing to the development of students' learning independence through the ability to manage the rhythm, time, and location of learning independently. Moodle supports the diversity of students' learning readiness by providing features that allow mapping of initial abilities, such as the level of independence, motivation, mastery of technology, and the capacity for independent learning management, so that the learning process can be adjusted more optimally (Reyes et al., 2023; Jumini et al., 2025).

From the perspective of learning interest, the use of Moodle has been proven to increase students' interest in the subject matter. As many as 58.75% of grade XI students agreed, and 14.55% strongly agreed, that learning through LMS is more interesting than conventional methods. In grade XII, 61.36% agreed and 17.84% strongly agreed. Activities such as quizzes, discussion forums, and learning videos are designed to increase motivation and make learning more enjoyable, aligning with the preferences of each student. Through Moodle, the presentation of material in an interactive format such as videos, simulations, and direct exercises on the platform, makes learning more interesting and relevant to industry needs, while increasing student motivation and memory through the integration of multimedia content (Yana & Adam, 2019; Raza et al., 2021; García, 2024). Interactive content and support for interesting learning scenarios on Moodle can increase students' interest in the learning process (Dwivedi et al., 2019; Bouilheres et al., 2020; Rahmi et al., 2024). Providing students with the opportunity to learn at their own pace and on their own learning path will increase interest in the discipline, while facilitating better and deeper learning outcomes (Terletska et al., 2023).

Meanwhile, from the learning profile aspect, Moodle is considered quite adaptive to the diversity of student learning styles, encompassing both visual, auditory, and kinesthetic approaches. LMS provides various material formats such as text, video, and interactive exercises that help students understand Sociology concepts in a way that suits their learning characteristics. This enhances the flexibility and effectiveness of the learning process, demonstrating that the Moodle LMS can support differentiated learning adaptively and responsively to the diverse needs of students. One concrete example of this flexibility is seen in Moodle's ability to provide a structured and functional platform for teachers to manage learning as a whole. Moodle-based LMS provides a structured platform that allows teachers to manage materials, assignments, and student activities efficiently through a systematic learning flow, uploading materials in various formats, and supporting features such as automatic notifications, discussion forums, and integrated evaluation tools (Sulistyorini & Anistyasari, 2020; Zaiarna, 2020; Andari, 2022). With these features, Moodle not only facilitates the management of learning materials and activities but also supports more active interactions between teachers and students, as evident in the development of discussion topics that enable both parties to participate more dynamically (Albakri & Abdulkhaleq, 2021).

Then, reviewed from the differentiated learning component, the implementation of the Moodle LMS also showed quite positive results. In terms of content, learning materials are presented in various formats, including text, video, and infographics. This diversity of media allows students to choose the form of presentation that best suits their learning style preferences. Moodle's flexible and efficient class management capabilities allow educators to easily update and adjust learning materials, while supporting the diversity of students' learning readiness through initial ability mapping features such as independence, motivation, technology mastery, and independent learning capacity, so that the learning process can be optimized personally (Reyes et al., 2023; Saliman et al., 2023). Moodle's features enable teachers to share materials in various formats, provide instructions, manage discussions, and conduct assessments efficiently, thereby creating a comfortable learning experience and supporting an adaptive approach that accommodates the diversity of students' learning styles (El-Maghraby, 2021; Simamora et al., 2022). Although the materials have not been explicitly adjusted at

different levels to accommodate differences in student readiness, this variation in content presentation reflects the basic principle of content differentiation, as outlined by Tomlinson, namely, providing access to materials in various ways to be more inclusive. This can be achieved through the integration of various learning resources, such as e-books, online assessment systems, thematic references, and project-based assignments, which are arranged flexibly and structured to encourage active student involvement and accommodate diverse approaches to demonstrating learning outcomes (Subashkevych et al., 2021).

In terms of the learning process, the results of the study showed that teachers tend to be more active in utilizing interactive quiz features, multiple-choice questions, and crossword puzzles in the Moodle LMS. Although these features are effective in measuring students' basic understanding, the use of Moodle is still limited and does not fully support the optimal implementation of differentiated learning. Other activities, such as discussion forums, reflective journals, or group-based projects, which are more in-depth and collaborative, are still rarely used. In fact, the design of flowchart-based learning paths, which can be facilitated through Moodle, allows teachers to align topics, methods, and assessments according to students' readiness and learning styles (Jamaluddin et al., 2022). Positive student responses to these varied features in several studies indicate that active engagement and space for more personalized learning are highly appreciated by learners (Hwang, 2020; Araya & Collanqui, 2021; Jones et al., 2021).

Furthermore, the use of LMS such as Moodle has been proven to encourage collaborative interactions, increase learning motivation, and strengthen student performance, satisfaction, and retention during the learning process, including in class discussions that require critical thinking (Falode & Mohammed, 2023). Therefore, teachers need to increase their capacity in designing more varied and meaningful learning activities through Moodle (Chen et al., 2024; Peramunugamage et al., 2024). On the other hand, the technical development of Moodle also needs to be directed towards increasing the interactivity and flexibility of the platform, in order to create a learning experience that is more engaging, relevant, and adaptive to students' needs in learning Sociology.

Meanwhile, in terms of learning products (products), LMS allows students to collect assignments in various forms, such as text documents and visual media. The use of Moodle in differentiated learning allows students to work on online assignments, divide assignments into several parts, repeat materials that have been learned, and collect assignments in various formats, such as text documents and visual media, according to individual learning needs and preferences (Morze et al., 2021; Lan, 2022). The use of Moodle increases motivation to complete assignments on time, while still providing an accurate picture of knowledge and skills assessment (Petrakova et al., 2022). However, some students still feel that they do not have enough freedom to express their understanding through more creative product forms such as videos, infographics, or multimedia presentations. This indicates that the application of product differentiation still requires further development to provide a more optimal space for students to demonstrate their understanding according to their potential and style of expression. Therefore, the development of product differentiation in Moodle needs to be continually carried out to provide a more optimal space for students to express their understanding according to their potential and learning style (Alomari, 2024). Additionally, in terms of assessment, it should be made more flexible and fair to accommodate various forms of student work. This is important because assessment plays a key role in education, helping to identify potential, evaluate progress, and support students' maximum self-development (Prasetya, 2021).

Finally, in terms of the learning environment, Moodle provides a structured, safe digital learning space that encourages students' independence in managing their learning activities. Most students expressed comfort in using LMS as a learning medium. Moodle provides a safe space for students to

convey their understanding without the pressure of direct interaction, thus creating an inclusive and comfortable digital learning environment (Berényi & László, 2023). The use of Moodle in learning supports the creation of an interactive and flexible learning style, allowing for learning anytime and anywhere (Makruf et al., 2022; Huda, 2023; Arifin et al., 2023). The Moodle system provides a flexible and dynamic digital learning environment, allowing teachers to create and present materials in a variety of formats without the constraints of a single design standard, so that it can be adapted to the learning needs of each institution (Bozkurt & Sharma, 2020; Wang et al., 2023). With its flexible and innovative characteristics, Moodle provides an engaging, meaningful, and easily accessible learning experience, offering students the freedom to prepare for learning comprehensively and offering evaluative features to effectively monitor their mastery of the material (Subashkevych et al., 2021; Kharchenko et al., 2021). However, challenges still arise, especially related to limited internet access and digital literacy gaps among students. This can be seen from the fact that there are still students who disagree with the convenience and effectiveness of using LMS. This condition highlights the need for enhanced infrastructure, technical support, and digital literacy training to foster a truly inclusive learning environment that supports all students. Improving the quality of LMS usage can be supported by providing adequate facilities, ongoing digital literacy training, and responsive technical assistance, so that all students can feel comfortable and effective in the learning process (Pysanko & Martynenko, 2020).

This study contributes to the development of educational science, especially in the application of differentiated learning strategies through the use of Moodle-based Learning Management System (LMS) in Sociology subjects. Referring to Tomlinson's differentiated learning theory, this study demonstrates that the features in Moodle can be utilized to tailor learning to students' readiness, interests, and learning profiles. An analysis of the four main components of content, process, product, and learning environment reveals that LMS can support the implementation of more adaptive learning and enhance students' learning independence. Empirically, the results of this study indicate that the use of Moodle can enhance the effectiveness of learning, although obstacles such as limited infrastructure and technological capabilities remain. Therefore, the results of this study provide a basis for the development of more inclusive digital-based learning designs, which can be used by educators, policymakers, and curriculum developers to strengthen school readiness in the face of 21st-century learning challenges.

CONCLUSION

The findings indicate that the Moodle-based Learning Management System (LMS) holds strong potential to support differentiated instruction in Sociology learning by providing flexible access to materials, accommodating diverse learning styles, and increasing student engagement. Based on responses from 176 students, 48.30% were high users, 26.14% were moderate, and 25.57% were low, with over 75% providing positive assessments of Moodle’s effectiveness, its ability to support differentiation, and its advantages over conventional methods. However, around 45% still experienced challenges, including limited infrastructure, unstable internet connections, and underutilization of available features. To address these issues, it is recommended that regular training be provided for teachers and students to optimize Moodle’s use, develop interactive and varied learning materials that cater to different abilities and interests, improve school infrastructure to ensure stable access, and strengthen institutional support for the integration of digital platforms. These measures are expected to enhance the quality of digital learning by fostering more varied, inclusive, and student-centered instructional practices in Sociology education.

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