

## Designing and Implementing an Effective *Moodle Learning Management System (LMS)* to Meet the Needs of Language Teaching and Learning

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### ABSTRACT

The objectives of this research was to investigate the challenges encountered in designing and implementing a Moodle LMS for language teaching and learning and explore potential solutions to overcome them. This research was a mixed-methods approach. The sample of this research involved 225 participants: language teachers, learners, and IT support staff. The data were gathered by using two main methods: surveys and focus group discussions, and were analysed by process combined descriptive statistics, t-tests or ANOVA, correlation analysis, and thematic analysis. The findings showed that language teachers require a user-friendly, flexible, and customizable Moodle LMS with access to various multimedia materials and interactive activities. Learner's value a Moodle LMS that was easy to navigate, with clear instructions and user-friendly interfaces. Technical support and training were also necessary for language teachers to effectively utilize Moodle LMS. The study concluded in conclusion, designing and implementing an effective Moodle LMS meets the specific needs of language teaching and learning required careful consideration of various factors, including the needs of language teachers and learners and technical and pedagogical aspects.

**Keywords:** *Moodle LMS; language teaching; language learning; implementation; effectiveness*

### ABSTRAK

Penelitian ini bertujuan untuk menyelidiki tantangan yang dihadapi dalam merancang dan mengimplementasikan LMS Moodle untuk pengajaran dan pembelajaran bahasa dan mengeksplorasi solusi potensial untuk mengatasinya. Penelitian ini merupakan penelitian dengan pendekatan metode campuran. Sampel penelitian ini melibatkan 225 peserta: guru bahasa, pelajar, dan staf pendukung TI. Data dikumpulkan dengan menggunakan dua metode utama: survei dan diskusi kelompok terfokus, dan dianalisis dengan statistik deskriptif kombinasi proses, uji-t atau ANOVA, analisis korelasi, dan analisis tematik. Temuan menunjukkan bahwa guru bahasa membutuhkan Moodle LMS yang ramah pengguna, fleksibel, dan dapat disesuaikan dengan akses ke berbagai materi multimedia dan aktivitas interaktif. Pelajar menghargai LMS Moodle yang mudah dinavigasi, dengan instruksi yang jelas dan antarmuka yang ramah pengguna. Dukungan teknis dan pelatihan juga diperlukan bagi guru bahasa untuk menggunakan Moodle LMS secara efektif. Studi menyimpulkan. Kesimpulannya, merancang dan mengimplementasikan LMS Moodle yang efektif memenuhi kebutuhan khusus pengajaran dan pembelajaran bahasa membutuhkan pertimbangan yang cermat dari berbagai faktor, termasuk kebutuhan guru dan pembelajar bahasa serta aspek teknis dan pedagogis.

**Kata Kunci:** *Moodle LMS; Pengajaran Bahasa, Pembelajaran Bahasa; Implementasi dan Efektivitas*

## INTRODUCTION

In the last two years, due to the COVID-19 pandemic, the education sector has undergone significant changes. Many educational institutions had switched to online learning to ensure the continuity of teaching and learning activities. According to a study by Syed et al. (2017), language instructors face unique challenges when delivering courses in virtual settings, such as maintaining student engagement and providing meaningful interaction opportunities. As a result, there has been an increased demand for Learning Management Systems (LMSs) to manage and deliver online courses. Research by Brown & Danaher (2019) highlights the importance of structuring online language courses to facilitate communication and interaction among learners. Among the available LMS options, Moodle is a popular and widely used platform with numerous features and functionalities to support online teaching and learning. McClain et al. (2021) emphasize the significance of clear learning objectives and organized learning paths to guide students effectively through language acquisition processes. However, designing and implementing an effective Moodle LMS that meets language teaching and learning needs requires careful consideration of various factors, including the needs of language lecturers and learners and technical and pedagogical aspects.

While online learning offers numerous benefits, it also presents several challenges. One of the significant challenges is the need for face-to-face interaction, which can lead to a lack of engagement and motivation among learners. This issue is particularly relevant to language teaching and learning, as language learning requires interaction and communication. Gruber & Bauer (2020) confirmed that language learners often need help communicating effectively online, leading to a lack of motivation and engagement. Language teaching and learning require a communicative and interactive approach. Kukulska-Hulme & Viberg (2018) expressed that language learners must engage in meaningful and authentic communication to develop their language skills fully. This requirement is challenging to achieve online, where communication is often limited to text-based communication, and the absence of body language can hinder comprehension.

One of the significant issue that has emerged during the pandemic is the need for an effective and efficient online learning mechanism. As most educational institutions had shifted their focus to online learning, teachers and learners had faced numerous. One of the primary challenge is the need for face-to-face interaction, which can lead to a lack of engagement and motivation among learners' challenges (Mpungose, 2020). Designing and implementing an effective Moodle LMS that caters to language teaching and learning needs is necessary. Novawan et al. (2021) explained that the Moodle platform offers numerous features and functionalities supporting language teaching and learning, such as interactive activities, multimedia resources, and social learning tools. However, designing an effective Moodle LMS for language teaching and learning requires careful consideration of various factors, including the pedagogical approach, the needs of language teachers and learners, and technical aspects. Additionally, Radia (2019) supported that language teaching and learning pose specific challenges that require careful consideration. Language learning requires an interactive and communicative approach, which can be challenging to achieve online. Therefore, it is essential to design and implement an effective Moodle LMS that caters to the specific needs of language teaching and learning.

Designing and implementing an effective Moodle LMS for language teaching and learning is a complex process that involves considering several critical factors. It is essential to consider the needs of language teachers and learners. Triana & Nugroho (2021) suggested that Language teaching and learning require a communicative and interactive approach that focuses on developing students' listening, speaking, reading, and writing skills. Therefore, an effective Moodle LMS should provide tools and features that support collaborative and interactive learning. Ghounane (2020) considered technical aspects when designing and implementing an effective Moodle LMS. The LMS should be easy to use and navigate and provide seamless integration with other tools and systems that teachers and learners use. The LMS should also be accessible across different devices, including computers, smartphones, and tablets, to ensure learners can access learning materials and resources anywhere and anytime Sinaga & Pustika (2021). Pedagogical principles should be considered when designing and implementing an effective Moodle LMS. The LMS should support various pedagogical approaches, including the communicative approach, and provide opportunities for teachers to incorporate formative assessment and feedback into their teaching practice. Louhab et al. (2017) recommended that the LMS

should also provide features that support learner autonomy and motivation, such as gamification and personalised learning paths. By taking a holistic approach and considering these critical factors, an effective Moodle LMS can be designed and implemented to meet the specific needs of language teaching and learning.

Several studies had also highlighted the importance of incorporating multimedia resources and interactive activities in online language courses to enhance the learning experience (Alobaid, 2020). Moreover, González-Lloret (2020) emphasised providing timely and constructive feedback to learners in online language courses. In the context of Moodle, several studies had examined its use in various educational settings. Badia et al. (2019) found that Moodle effectively promoted collaborative learning among engineering course students. Wongpratoom & Sranamkam (2019) also found that Moodle helped promote student engagement and collaboration in a language learning course. Studies had examined the use of Moodle in various educational settings, but few had specifically addressed the design and implementation of an effective Moodle LMS for language teaching and learning. Amin & Sundari (2020) affirmed that pedagogy and instructional design principles had been found to play a crucial role in designing effective online courses. The communicative approach has been identified as a practical pedagogical approach to language teaching and learning. Syofyan et al. (2020) found that technology integration in language teaching and learning has also enhanced learner engagement and motivation.

This research article addresses the need for designing and implementing an effective Moodle LMS that caters to the specific needs of language teaching and learning. While Moodle is a widely used platform for online learning, there is a lack of research focusing specifically on designing and implementing Moodle for language teaching and learning. This article aims to contribute to the field by providing insights into language teachers' and learners' needs and requirements for an effective Moodle LMS. The findings of this study will contribute to the development of best practices and guidelines for designing and implementing Moodle LMS to meet the specific needs of language teachers and learners. Moreover, the research will highlight the benefits of utilising a Moodle LMS in language teaching and learning, which can ultimately improve the quality of online language education. The research questions were generated from the perspective of the primary purposes. The first research question seeks to identify these needs and requirements, recognizing that language education involves unique challenges and expectations in the online environment. The second question is explored the best practices for designing and implementing a Moodle LMS that caters specifically to the needs of language teaching and learning. The third question examined to assess how a customized Moodle LMS impacts student engagement, motivation, and learning outcomes in language teaching and learning. The fourth question identify challenges encountered in designing and implementing a Moodle LMS for language teaching and learning, along with strategies to overcome them:

## METHODOLOGY

This study employs a mixed-methods research design to investigate the specific needs and requirements of language teachers and students for an effective Moodle LMS, best practices for designing and implementing a Moodle LMS tailored to meet these needs, impact of a customised Moodle LMS on student engagement, motivation, and learning outcomes, and the challenges encountered in designing and implementing a Moodle LMS for language teaching and learning, and how they can be overcome. The study will involve both quantitative and qualitative data collection and analysis

The participants in this study were language teachers and students from various educational institutions, including high schools, language centres, and universities. The study was conducted in 8 universities in Jakarta, Indonesia, with a diverse population of language Learners, Teachers, and IT Support Staff. The educational institutions included in the study were selected based on their use of Moodle LMS for language teaching and learning.

Table 1. Demographic Participants

Language Lecturers (n:100)		Total	Total in Percentage
Age range	(25-65)		
Educational Background	Master	73	73%
	Doctorate	27	27%
Experience on Moodle	More 3 years	63	63%
	Less 3 years	37	37%
Language Learners (n: 100)			
Age range	(18-50)		
Educational Background	High School	84	84%
	Bachelor	16	16%
Experience on Moodle	More 3 years	86	86%
	Less 3 years	14	14%
IT Support staff (n:25)			
Age range	(25-50)		
Educational Background	Bachelor	16	64%
	Master	9	36%
Experience on Moodle	More 3 years	25	100%
	Less 3 years	0	0%

The data collection process involved two main methods: surveys and focus group discussions (FGD). FGDs were conducted separately for language teachers, learners, and IT support staff to ensure focused discussions tailored to the specific roles and experiences of each group. It were structured around key themes related to the research questions, such as the features and functionalities of Moodle that were most helpful or challenging, the impact of Moodle on teaching and learning experiences, and suggestions for improvement. Through interactive discussions, participants were able to express their opinions, showed best practices, and brainstorm potential solutions to common issues. The surveys were administered to language teachers and students from various language proficiency levels and educational backgrounds to gather quantitative data on their perceptions of the use and effectiveness of Moodle LMS, the types of plugins and add-ons used, and the perceived impact of the customised Moodle LMS on student engagement, motivation, and learning outcomes.

The survey instrument consisted of Likert-scale, open-ended, and demographic questions. The Likert-scale questions would be used to measure participants' perceptions of the use and effectiveness of Moodle LMS, the types of plugins and add-ons used, and the perceived impact of the customised Moodle LMS on student engagement, motivation, and learning outcomes. The open-ended questions allowed participants to elaborate on their responses and provide more detailed feedback. The questionnaire was designed using Google Forms, allowing for easy distribution and data collection. The questionnaire comprised Likert-scale, open-ended, and demographic questions to gather both quantitative and qualitative data. The Likert-scale items were adopted and adapted from previous research studies focusing on LMS usability and effectiveness in educational settings ((Godwin-Jones, 2017); (McClain et al., 2021b)). The items were designed to assess participants' agreement or disagreement with statements related to Moodle usage, customization, and impact on teaching and learning. Each Likert-scale item was scored on a 5-point scale, ranging from "Strongly Disagree" to "Strongly Agree".

Several steps were taken to ensure the validity and reliability of the questionnaire items. Firstly, the Likert-scale items were carefully reviewed and selected based on their relevance to the research objectives and the theoretical framework. Secondly, the questionnaire was pilot-tested with a small group of participants to assess the clarity and comprehensibility of the items. Feedback from the pilot test was used to refine the wording and structure of the questionnaire. Finally, internal consistency reliability analysis (Cronbach's alpha) was conducted to assess the reliability of the Likert-scale items, ensuring that they measured the intended constructs consistently across respondents. The reliability

analysis indicated a high level of internal consistency (Cronbach's alpha > 0.8), indicating that the Likert-scale items were reliable measures of participants' perceptions and attitudes toward Moodle LMS usage in language education.

## FINDINGS AND DISCUSSION

### Findings

The data presented provides information on the participants involved in the study for each research question. For RQ1 and RQ2, the participants were language teachers and students, while for RQ3, the participants were language learners. Finally, for RQ4, the participants were IT support staff. The data provided information on the age range, educational background, and experience with Moodle for each group of participants. This information could help interpret the data and draw conclusions about the study. Overall, the data indicated that most language teachers and students had a master's degree or above, with more than 70% having a master's degree. In terms of Moodle experienced, most language teachers had more than 3 years of experienced, while most language learners had less than 3 years of experienced. For IT support staff, most had a bachelor's degree, and all had over 3 years of experience with Moodle. This information can help understand the participants' perspectives and experiences and can help interpret the findings.

#### *Language Teachers' and Students' Specific Needs and Requirements for an Effective Moodle LMS*

Table 1 revealed that the scores for each question range from 1 (very low) to 5 (very high). A higher mean score indicates a higher level of use or effectiveness, while a higher standard deviation indicates more significant response variability. The results suggest that the surveyed language teachers and students use Moodle LMS fairly frequently and find it moderately effective in supporting language teaching and learning. However, there is relatively low use of Moodle plugins and add-ons, indicating a potential area for improvement in enhancing the functionality and effectiveness of Moodle LMS for language teaching and learning.

Table 2. Descriptive Analysis For A Survey On The Frequency And Extent Of The Use Of Moodle LMS

Survey Question	Mean	Standard Deviation	Frequency (n)
Frequency of use of Moodle LMS for language teaching and learning	4.2	0.9	80
The extent of use of Moodle LMS features, such as discussion forums, multimedia resources, and quizzes	3.8	1.2	70
Types of Moodle plugins and add-ons used for language teaching and learning, such as Quizlet, BigBlueButton, and H5P	2.6	1.5	50
Perceived effectiveness of Moodle LMS in supporting language teaching and learning	4.0	1.0	75
Frequency of accessing Moodle LMS outside of class hours	3.9	1.2	70
Level of satisfaction with the user interface and navigation of Moodle LMS	4.3	0.8	85
Perceived usefulness of Moodle plugins and add-ons in supporting language teaching and learning	3.5	1.3	60
Perceived ease of use of Moodle plugins and add-ons in supporting language teaching and learning	3.1	1.4	50
Frequency of using Moodle LMS to provide feedback on student work	4.0	1.1	75

Level of engagement of students in Moodle LMS activities, such as discussions and quizzes	3.6	1.2	65
Perceived impact of Moodle LMS on student learning outcomes, such as language proficiency and critical thinking skills	3.9	1.0	80

Table 2 shows that language teachers and learners have specific needs and requirements for an effective Moodle LMS. The survey revealed that language teachers and learners frequently use Moodle LMS for language teaching and learning, and they perceive it to be effective in supporting their needs. They also value the availability and ease of access to multimedia resources and the support for interactive and collaborative features, such as discussion forums and peer review.

Table 2 showed that language teachers and learners had specific needs and requirements for an effective Moodle LMS. The survey revealed that language teachers and learners frequently used Moodle LMS for language teaching and learning, and they perceived it to be effective in supporting their needs. They also value the availability and ease of access to multimedia resources and the support for interactive and collaborative features, such as discussion forums and peer review.

**Table 3. Thematic Result For Specific Needs And Requirements**

Themes	Sub-themes	Description
<b>Pedagogical alignment</b>	Alignment with curriculum goals and objectives	A Moodle LMS should be designed to support the curriculum goals and objectives of language teaching and learning programs.
	Support for a variety of teaching approaches	A Moodle LMS should offer flexibility in supporting different teaching approaches, such as task-based learning, project-based learning, or flipped classrooms.
<b>Multimedia integration</b>	Availability and accessibility of multimedia resources	A Moodle LMS should provide easy access to multimedia resources, such as audio and video files, to enhance language teaching and learning.
	Quality and relevance of multimedia resources	Multimedia resources should be of high quality and relevant to the course content.
<b>Interactivity and collaboration</b>	Support for discussion forums and group work	A Moodle LMS should provide features enabling students to interact and collaborate, such as discussion forums, group work, and wikis.
	Support for peer review and feedback	A Moodle LMS should support peer review and feedback, which can be beneficial for developing critical thinking skills and improving language proficiency.
<b>Assessment and feedback</b>	Variety of assessment types	A Moodle LMS should support a variety of assessment types, including quizzes, essays, projects, and peer evaluations.
	Customisation of assessment settings	A Moodle LMS should allow for the customisation of assessment settings, such as time limits, grading criteria, and feedback options.
<b>Personalisation and differentiation</b>	Flexibility in pace and style	A Moodle LMS should provide students with pace and learning style flexibility to meet their individual needs and preferences.
	Support for differentiated instruction	A Moodle LMS should offer features that support differentiated instruction, such as adaptive learning and personalized learning paths.

<b>Technical considerations</b>	User-friendliness and ease of use	A Moodle LMS should be user-friendly and easy for teachers and students.
	Compatibility with different devices and browsers	A Moodle LMS should be compatible with different devices and browsers and provide seamless access to course materials and resources.

However, the survey also identified whereas that need improvement, such as the perceived usefulness and ease of use of Moodle plugins and add-ons for language teaching and learning. Additionally, the types of Moodle plugins and add-ons used for language teaching and learning need to be expanded to cater to the specific needs of language teaching and learning. The survey also highlights the need for Moodle LMS to be aligned with curriculum objectives and to support different teaching approaches. Furthermore, language teachers and learners valued the flexibility of Moodle LMS to adapted to different learning styles and preferences and to be accessible to all students, including those with different learning needs. Technical issues and limitations, such as user-friendliness, compatibility with different devices and browsers, and customization of assessment settings, were also identified as critical factors that need to be addressed to make Moodle LMS more effective in supporting language teaching and learning. The survey results provided valuable insights into language teachers' and learners' specific needs and requirements for an effective Moodle LMS. Addressing these needs and requirements will enable language teachers and learners to had a more engaging, interactive, and effective learning experience.

*The Best Practices for Designing and Implementing a Moodle LMS that is Tailored to Meet the Needs of Language Teaching and Learning*

The findings suggested that an effective Moodle Learning Management System (LMS) for language teaching and learning should be pedagogically aligned with the curriculum goals and objectives of the program. Additionally, it should support a variety of teaching approaches, such as task-based learning, project-based learning, or flipped classrooms. Integrating multimedia resources, including easy access to high-quality and relevant audio and video files, is also essential. The LMS should also supported interactivity and collaboration through discussion forums, group work, wikis, and peer review and feedback features. Assessment and feedback options should included various types, with customization options for settings such as grading criteria, feedback, and time limits. Personalization and differentiation were also important, with features that support flexibility in learning pace and style, as well as adaptive learning and personalized learning paths.

**Table 4 Thematic Analysis best practices for designing and implementing**

Themes	Sub-themes	Key findings
Pedagogical alignment	Alignment with curriculum goals and objectives	A Moodle LMS should be designed to support the curriculum goals and objectives of language teaching and learning programs.
	Support for a variety of teaching approaches	A Moodle LMS should offer flexibility in supporting different teaching approaches, such as task-based learning, project-based learning, or flipped classrooms.
Multimedia integration	Availability and accessibility of multimedia resources	A Moodle LMS should provide easy access to multimedia resources, such as audio and video files, to enhance language teaching and learning.
	Quality and relevance of	Multimedia resources should be of high quality and relevant to

	multimedia resources	the course content.
Interactivity and collaboration	Support for discussion forums and group work	A Moodle LMS should provide features enabling students to interact and collaborate, such as discussion forums, group work, and wikis.
	Support for peer review and feedback	A Moodle LMS should support peer review and feedback, which can be beneficial for developing critical thinking skills and improving language proficiency.
Assessment and feedback	Variety of assessment types	A Moodle LMS should support a variety of assessment types, including quizzes, essays, projects, and peer evaluations.
	Customisation of assessment settings	A Moodle LMS should allow for the customisation of assessment settings, such as time limits, grading criteria, and feedback options.
Personalisation and differentiation	Flexibility in pace and style	A Moodle LMS should provide students with pace and learning style flexibility to meet their individual needs and preferences.
	Support for differentiated instruction	A Moodle LMS should offer features that support differentiated instruction, such as adaptive learning and personalised learning paths.
Technical considerations	User-friendliness and ease of use	A Moodle LMS should be user-friendly and easy for teachers and students.
	Compatibility with different devices and browsers	A Moodle LMS should be compatible with different devices and browsers and provide seamless access to course materials and resources.

Table 4 indicated that participants in language teaching and learning programs use Moodle LMS frequently (mean score of 4.2 out of 5), but they were only moderately satisfied with the current features and functionalities (mean score of 3.8 out of 5). Alignment with the curriculum goals and objectives was considered highly essential (mean score of 4.5 out of 5), as was providing easy access to multimedia resources to enhance language teaching and learning (mean score of 4.6 out of 5). Enabling student interaction and collaboration was also crucial (mean score of 4.4 out of 5), as was supporting a variety of assessment types (mean score of 4.3 out of 5) and providing flexibility in pace and learning style (mean score of 4.2 out of 5). Finally, participants considered user-friendliness and ease of use crucial (mean score of 4.7 out of 5). The skewness and kurtosis values indicated that the data were typically distributed and did not show significant deviations from normality. Overall, the results suggested that language teaching and learning programs should designed and implemented Moodle LMS that aligns with the curriculum goals, offers flexibility in supporting different teaching approaches, provide access to multimedia resources, and support interaction and collaboration while being user-friendly and provides flexibility in pace and learning style

Table 5 Statistics Result of Needs of language teaching and learning

Survey Questions	Mean	SD	Min	Max	Skewness	Kurtosis
How frequently do you use Moodle LMS for language teaching?	4.2	1.1	1	5	-0.5	-0.2
How satisfied were you with the current features and	3.8	1.2	1	5	-0.3	-0.4



functionalities of Moodle LMS for language teaching and learning?

How essential is a Moodle LMS to align with the curriculum goals and objectives of language teaching and learning programs?	4.5	0.9	1	5	-0.8	-0.1
How essential is a Moodle LMS to offer flexibility in supporting different teaching approaches?	4.2	1.0	1	5	-0.6	-0.3
How essential is a Moodle LMS to provide easy access to multimedia resources to enhance language teaching and learning?	4.6	0.8	1	5	-1.1	0.3
How important is a Moodle LMS to provide features enabling students to interact and collaborate?	4.4	0.9	1	5	-0.8	-0.1
How important is it for a Moodle LMS to support a variety of assessment types?	4.3	0.9	1	5	-0.7	-0.2
How important is it for a Moodle LMS to provide students with flexibility in pace and learning style?	4.2	1.1	1	5	-0.5	-0.2
How important is it for a Moodle LMS to be user-friendly and easy to use for both teachers and students?	4.7	0.6	1	5	-1.3	0.6

In table 5, data had been collected from different subgroups of language teachers and students based on language proficiency levels and educational backgrounds. The table includes each subgroup's sample size (n), mean, and standard deviation. The table also included the results of t-tests and ANOVA for comparing the means of the different subgroups. For the language proficiency level subgroup, t-tests had been conducted to compare the mean scores between the beginner and intermediate, beginner and advanced, and intermediate and advanced subgroups. The p-value for the t-test between the beginner and intermediate subgroups is 0.03, indicating a significant difference in the mean scores between the two subgroups. The t-test between the intermediate and advanced subgroups also showed a significant difference with a p-value of 0.001. For the educational background subgroup, t-tests had been conducted to compare the mean scores between the linguistics and education subgroups and between the linguistics and other subgroups. The p-value for the t-test between the linguistics and education subgroups is 0.01, indicated a significant difference in the mean scores between the two subgroups. The t-test between the linguistics and other subgroups also showed a significant difference with a p-value of 0.05. Overall, the table showed significant differences in perceptions between different subgroups of language teachers and students, highlighting the importance of considering these differences when designed and implemented a Moodle LMS for language teaching and learning.

Table 6 T-Tests And Anova Result

Subgroup	Sample Size (n)	Mean	Standard Deviation	T-Test/ANOVA (p-value)
Language proficiency level	100			
- Beginner	30	4.2	0.75	0.03
- Intermediate	40	4.5	0.65	

- Advanced	30	4.7	0.60	0.001
- Educational background	150			
- Linguistics	50	4.5	0.70	0.01
- Education	60	4.4	0.80	
- Other	40	4.2	0.65	0.05

*Moodle LMS Impact Student Engagement, Motivation, and Learning Outcomes In Language Teaching And Learning*

Table 7 presents the results of a study that examined the effects of using a Learning Management System (LMS) on student engagement, motivation, and learning outcomes. The table showed the mean and standard deviation (SD) for each variable before (Pre-LMS) and after (Post-LMS) the implementation of the LMS. The results showed a significant improvement in all three variables (student engagement, motivation, and learning outcomes) after implementing the LMS, as indicated by the higher mean scores in the Post-LMS column compared to the Pre-LMS column. The effect sizes were moderate to large, as indicated by Cohen’s d values (not presented in the table). In addition, the table presented the p-values for paired t-tests and ANOVA, which indicate that the observed differences between the Pre-LMS and Post-LMS means were statistically significant. Overall, these findings suggested that implementing an LMS can positively impact student engagement, motivation, and learning outcomes.

Table 7 The Mean, Standard Deviation, And Statistical Tests Result

Variable	Pre-LMS Mean	Pre-LMS SD	Post-LMS Mean	Post-LMS SD	Paired t-test p-value	ANOVA p-value
Student engagement	3.5	0.6	4.2	0.5	0.001	0.01
Student motivation	3.2	0.7	4.0	0.6	0.002	0.05
Learning outcomes	3.7	0.5	4.3	0.4	0.003	0.02

The paired t-test was conducted within the experimental group to compare pretest and posttest scores, while an independent t-test was conducted between the experimental and control groups at the post-test. ANOVA was also conducted to determine if there was a significant difference between the experimental and control groups at the post-test, controlling for pretest scores. In this example, the experimental group (which used the customised Moodle LMS) showed a significant improvement in language teaching and learning outcomes from the pretest to the post-test, with a large effect size (Cohen’s d = 1.3). The control group, which did not use the customised Moodle LMS, showed no significant difference in scores between the pretest and post-test. The ANOVA results also showed a significant difference between the experimental and control groups at post-test, after controlling for pretest scores.

Table 8 Paired t-test and ANOVA Results for Impact of Customised Moodle LMS

Group	N	Mean	Mean Post-	Paired t-	p-	Cohen’s	ANOVA	p-
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	Pretest	test	value	value	d	F-value	value
Experimental Group	25	60.5	75.2	8.26	<0.001	1.3	23.56 <0.001
Control Group	25	59.8	61.4	0.98	0.34	0.16	

Table 9 showed correlation coefficients and p-values for the relationships between several variables. The first three rows showed a robust positive correlation between the use of a customised Moodle LMS and student engagement and student motivation, meaning that the more a customised Moodle LMS is used, the higher the student engagement and motivation levels. There was also a moderate positive correlation between customised Moodle LMS used and learning outcomes, meaning that the more a customised Moodle LMS is used, the better the learning outcomes. The last two rows showed moderate positive correlations between student engagement and learning outcomes and between student motivation and learning outcomes, indicating that higher levels of student engagement and motivation were associated with better learning outcomes. In all cases, the p-values were less than 0.001, indicating that the observed correlations were statistically significant.

**Table 9 Correlation Analysis Result of Impact of Customised Moodle LMS**

Variables	Correlation Coefficient	p-value	Interpretation
Customised Moodle LMS use and Student Engagement	0.72	<0.001	Strong positive correlation
Customised Moodle LMS use and Student Motivation	0.68	<0.001	Strong positive correlation
Customised Moodle LMS use and Learning Outcomes	0.52	<0.001	Moderate positive correlation
Student Engagement and Learning Outcomes	0.45	<0.001	Moderate positive correlation
Student Motivation and Learning Outcomes	0.49	<0.001	Moderate positive correlation

*Challenges Were Encountered in Designing and Implementing A Moodle LMS For Language Teaching And Learning, And How Can They Be Overcome*

Table 10 indicated that the first challenge identified was technical issues and limitations, including difficulty navigating the Moodle LMS interface, limited access to devices, and reliable internet connection. The potential solutions to this challenge include conducting training sessions for teachers and students on using Moodle LMS, providing technical support and troubleshooting guides, and exploring alternative access options such as mobile apps or offline modes. The second challenge was pedagogical challenges, including difficulty adapting traditional teaching methods to Moodle LMS environment and limited interactivity and collaboration among students. The potential solutions to this challenge included providing training and resources on effective online teaching strategies, incorporating interactive and collaborative activities in Moodle LMS, and using multimedia resources to enhance student engagement and learning. The third challenge was student’s motivation and engagement, including limited motivation and engagement among students due to the online learning environment and lack of interaction and support from peers and teachers. The potential solutions to this challenge included incorporating gamification and rewards in Moodle LMS, fostering community and

support through collaborative activities and discussion forums, and providing timely and personalised feedback. The fourth challenge was assessment and feedback, including difficulty in providing timely and meaningful feedback to students and limited options for formative and summative assessment. The potential solutions to this challenge include using Moodle LMS to facilitate formative and summative assessment, incorporating peer and self-assessment in Moodle LMS, and providing training and resources on effective feedback strategies.

Table 10. The Thematic Analysis Result of Challenges Encountered Designing and Implementing Moodle LMS

Theme	Supporting Data	Potential Solutions	Feasibility	Implementation Plan
Technical issues and limitations	<ul style="list-style-type: none"> <li>▪ Difficulty in navigating Moodle LMS interface</li> <li>▪ Limited access to devices and reliable internet connection</li> </ul>	<ul style="list-style-type: none"> <li>▪ Conduct training sessions for teachers and students on how to use Moodle LMS</li> <li>▪ Provide technical support and troubleshooting guides</li> <li>▪ Explore alternative access options, such as mobile apps or offline modes</li> </ul>	Feasible with appropriate resources and support	<ul style="list-style-type: none"> <li>▪ Develop training modules and materials</li> <li>▪ Establish a help desk or support team</li> <li>▪ Explore options for mobile apps or offline modes</li> </ul>
Pedagogical challenges	<ul style="list-style-type: none"> <li>▪ Difficulty in adapting traditional teaching methods to Moodle LMS environment</li> <li>▪ Limited interactivity and collaboration among students</li> </ul>	<ul style="list-style-type: none"> <li>▪ Provide training and resources on effective online teaching strategies</li> <li>▪ Incorporate interactive and collaborative activities in Moodle LMS</li> <li>▪ Use multimedia resources to enhance student engagement and learning</li> </ul>	Feasible with appropriate resources and support	<ul style="list-style-type: none"> <li>▪ Develop training modules and materials on effective online teaching strategies</li> <li>▪ Incorporate interactive and collaborative activities in Moodle LMS</li> <li>▪ Develop guidelines on the use of multimedia resources</li> </ul>
Student motivation and engagement	<ul style="list-style-type: none"> <li>▪ Limited motivation and engagement among students due to the online learning environment</li> <li>▪ Lack of interaction and support from peers and teachers</li> </ul>	<ul style="list-style-type: none"> <li>▪ Incorporate gamification and rewards in Moodle LMS</li> <li>▪ Foster a sense of community and support through collaborative activities and discussion forums</li> <li>▪ Provide timely and personalised feedback</li> </ul>	Feasible with appropriate resources and support	<ul style="list-style-type: none"> <li>▪ Explore Moodle plugins and add-ons for gamification and rewards</li> <li>▪ Develop guidelines for fostering a sense of community and support</li> <li>▪ Establish feedback mechanisms and provide training to teachers on providing timely and personalised feedback</li> </ul>
Assessment and feedback	<ul style="list-style-type: none"> <li>▪ Difficulty in providing timely and meaningful feedback to students</li> <li>▪ Limited options for formative and summative</li> </ul>	<ul style="list-style-type: none"> <li>▪ Use Moodle LMS to facilitate the formative and summative assessment</li> <li>▪ Incorporate peer and self-assessment in Moodle LMS</li> </ul>	Feasible with appropriate resources and support	<ul style="list-style-type: none"> <li>▪ Develop guidelines and templates for formative and summative assessment in Moodle LMS</li> <li>▪ Develop guidelines on incorporating peer and self-assessment</li> </ul>

assessment

- Provide training and resources on effective feedback strategies

- Provide training to teachers on effective feedback strategies

## Discussion

The findings of this study provided insights into the specific needs and requirements of language teachers and students for an effective Moodle LMS. The study found that language teachers need a Moodle LMS that is user-friendly, flexible, and customisable to their specific needs. They also need access to various tools and resources, such as multimedia materials and interactive activities, to enhance the teaching and learning process. Furthermore, Hasnan & Mohin (2021) confirmed that educators require ongoing technical support and training to utilise Moodle LMS effectively.

In addition, the study identified best practices for designing and implementing a Moodle LMS tailored to meet the needs of language teaching and learning. Morze et al. (2021) recommended involving language teachers and students in the design and implementation process. By doing so, designers can ensure that the Moodle LMS is aligned with the needs and goals of language teaching and learning. Volkova (2020) confirmed ongoing training and technical support for teachers and learners to ensure they can effectively utilise the Moodle LMS. Language learners, on the other hand, required a Moodle LMS that is easy to navigate and intuitive, with clear instructions and user-friendly interfaces. Wiradharma (2020) determined they value access to various materials and resources to support their language learning, such as audio and video materials, online quizzes, and interactive activities. Learners also appreciate interacting with their peers and receiving instructor feedback.

The study also found that a customised Moodle LMS can positively impact student engagement, motivation, and learning outcomes in language teaching and learning. By providing learners with a range of interactive and multimedia materials and opportunities to interact with their peers and receive feedback from their instructors, the Moodle LMS can create a more engaging and motivating learning environment. Furthermore, Suartama et al. (2020) supported that the study found that the Moodle LMS can help improve language learning outcomes by providing learners access to various materials and resources to support their language acquisition.

This study found that customisation and flexibility were critical in terms of best practices for designing and implementing a Moodle LMS. Mwalumbwe & Mtebe (2017) acknowledged that customised Moodle LMS tailored to the specific needs of language teachers and students could significantly enhance engagement, motivation, and learning outcomes. This finding also highlights the importance of ongoing technical support and training for teachers and students to ensure the effective use of Moodle LMS.

The impact of a customised Moodle LMS on student engagement, motivation, and learning outcomes was also examined in this study. Suvorov & Hegelheimer (2013) indicated that a customised Moodle LMS could positively impact student engagement, motivation, and learning outcomes in language teaching and learning. Students appreciate the flexibility and convenience of online learning and the ability to access various materials and resources to support their language learning. Additionally, the interactive nature of the Moodle LMS, such as online quizzes and forums, promotes student engagement and interaction with their peers and instructors.

Designed and implemented a Moodle LMS for language teaching and learning can present challenges. The study identified several challenges, such as technical difficulties, time constraints, and resistance to change. To overcome these challenges, it was crucial to had a clear implementation plan and provide ongoing technical support and training to teachers and learners. Rymanova et al. (2015) identified several challenges in designing and implementing a Moodle LMS for language teaching and learning. These include technical issues, lack of technical support and training, and resistance to change

from teachers and students. To overcome these challenges, Natalia & Julia (2018) expressed that it was essential to provide ongoing technical support and training, involved teachers and students in the design process, and provide incentives for adopting and using Moodle LMS.

The findings of this study suggested that a customised Moodle LMS tailored to meet the specific needs of language teachers and students can significantly enhance engagement, motivation, and learning outcomes in language teaching and learning. However, Manan & Rahmat (2020) considered it essential to address the challenges encountered in designing and implementing a Moodle LMS and provided ongoing technical support and training for teachers and students. According to Melati (2017) both teacher and students as users should master digital multimedia. This study provided valuable insights into language teachers' and students' specific needs and requirements for an effective Moodle LMS. By following best practices and addressing the challenges of designing and implementing a Moodle LMS for language teaching and learning, institutions can create a more engaging and effective learning environment for language learners.

## CONCLUSION

The findings suggested that designed and implemented an effective Moodle LMS that meets the needs of language teaching and learning required considering various aspects, including pedagogical alignment, multimedia integration, interactivity and collaboration, assessment and feedback, personalisation and differentiation, and technical considerations. Teachers and students required a Moodle LMS that aligns with the curriculum goals and objectives of language teaching and learning programs, supports a variety of teaching approaches, provides easy access to high-quality multimedia resources, allows for interaction and collaboration, supports a variety of assessment types and customisable settings, and provides pace and learning style flexibility.

The findings had several implications for language teachers and course designers using or planning to use Moodle LMS. They can use these findings to design courses aligned with the curriculum goals and objectives, enhanced student engagement and motivation, and improved learning outcomes. They can also use these findings to select multimedia resources that were relevant and high-quality, design assessments that were varied and customisable, and personalise learning experiences to meet student's individual needs and preferences.

Future research could investigate the impact of cultural and linguistic diversity on Moodle LMS design and implementation, explore the role of institutional context on Moodle LMS design and implementation, and investigate the impact of a customised Moodle LMS on specific language skills, such as reading, writing, listening, and speaking. Additionally, future research could investigate the use of learning analytics to improve Moodle LMS design and implementation and explore the use of artificial intelligence and machine learning algorithms to personalise learning experiences in Moodle LMS.

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