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DEVELOPMENT OF ILMUONE CLOUD AS A LEARNING RESOURCE AT SMK MUHAMMADIYAH 6 LEUWILIANG: A LITERATURE STUDY

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Abstrak

Penelitian ini bertujuan untuk mengembangkan dan mengkaji IlmuOne Cloud sebagai Learning Management System (LMS) guna meningkatkan efektivitas dan fleksibilitas pembelajaran daring di SMK Muhammadiyah 6 Leuwiliang. Penelitian ini dilatarbelakangi oleh keterbatasan pembelajaran konvensional yang membatasi akses materi, interaksi, dan evaluasi pembelajaran secara optimal. Metode penelitian yang digunakan adalah Research and Development (R&D) dengan model ADDIE, yang meliputi tahap analisis, desain, pengembangan, implementasi, dan evaluasi. Pengumpulan data dilakukan melalui studi literatur, analisis kebutuhan pembelajaran, serta kajian hasil penelitian terdahulu yang relevan dengan pengembangan LMS di Pendidikan vokasi. Hasil penelitian menunjukkan bahwa pengembangan LMS berbasis ADDIE menghasilkan sistem pembelajaran yang terstruktur, mudah diakses, dan berorientasi pada kebutuhan pengguna. Integrasi teknologi cloud dan fitur kuis online secara real-time mampu meningkatkan interaksi guru dan siswa, mendukung evaluasi pembelajaran secara langsung, serta mendorong kemandirian dan motivasi belajar peserta didik. Dampak penelitian ini menunjukkan bahwa IlmuOne Cloud berpotensi meningkatkan kualitas pembelajaran digital dan menjadi solusi pembelajaran yang adaptif serta berkelanjutan di SMK pada era transformasi digital.

Kata kunci : learning management system; ADDIE; e-learning; pendidikan vokasi

Abstract

This research aims to develop and examine IlmuOne Cloud as a Learning Management System (LMS) to improve the effectiveness and flexibility of online learning at SMK Muhammadiyah 6 Leuwiliang. The study focuses on addressing the limitations of conventional classroom-based instruction, particularly restricted access to learning materials and the absence of real-time evaluation. The research employed a Research and Development (R&D) approach using the ADDIE model, which consists of analysis, design, development, implementation, and evaluation stages. Data were collected through literature analysis, needs analysis, expert validation results, and findings from previous LMS-based development studies relevant to vocational education. The results indicate that LMS development using the ADDIE model produces a system that is systematically designed, user-oriented, and adaptable to learners' needs. The integration of cloud-based access and real-time online quizzes enhances

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learner interaction, supports immediate feedback, and promotes independent learning. The research demonstrates that IlmuOne Cloud has the potential to increase learning effectiveness, motivation, and instructional quality. The impact of this study provides a conceptual and practical reference for developing LMS-based digital learning systems in vocational schools, especially in supporting sustainable and inclusive education in the digital era.

***Keywords**: learning management system; ADDIE model; e-learning; vocational education.*

I. INTRODUCTION

In the context of modern education, particularly at the vocational high school (SMK) level, the challenge of maintaining the quality of learning has become increasingly complex with the development of information technology. Online learning has become a primary necessity, especially during the pandemic, which has limited physical interaction in classrooms. Information technology is not only a tool, but also a foundation for ensuring that the educational process remains effective and inclusive. Therefore, innovation in the learning system is crucial to overcome the limitations of space and time often faced by students and teachers. SMK Muhammadiyah 6 Leuwiliang, as a vocational education institution, faces similar demands in aligning its curriculum with the needs of the times. Online learning requires facilities that can facilitate interaction, material distribution, and real-time evaluation. Without the right technological support, the quality of education can decline, so innovative solutions are needed to maintain student motivation and teaching effectiveness. This is the background for the importance of developing a digital-based learning system at the school.

One of the main solutions that has proven effective is the use of a Learning Management System (LMS), which is software for managing various aspects of distance learning. LMS not only provides a platform for distributing materials, but also supports administration, documentation, and validation of the learning process. In this context, LMS acts as a bridge between conventional and digital methods, enabling education to take place without geographical limitations. The use of LMS has become a global standard for supporting quality online learning. According to Hardika (2021), LMS is defined as software used for administration, documentation, validation, reporting, learning activities, and online distance learning. This system contains learning modules or materials that can be accessed at any time, thereby facilitating independent learning for students. This definition emphasizes the flexibility of LMS as a tool to optimize the educational process, especially in emergency situations such as a pandemic. Thus, LMS reflects a technological solution for an effective distance learning model.

Alifiyanti (2019) adds that fulfilling students' learning needs requires learning management packaged in a system known as LMS. This approach ensures that every student has fair access to learning materials and resources, regardless of time or location constraints. E-learning, as the core of LMS, transfers the conventional teaching and learning process to the virtual world through web-based applications, thereby increasing efficiency and accessibility. LMS such as Moodle has become a popular choice due to its ability to manage online learning activities (Ouadoud et al., 2018). Moodle, as one of the leading LMS, was introduced by Martin Dougiamas, a computer scientist and educator from Australia. Gadsdon (2010) describes Moodle as open source software used to create internet-based learning materials and

courses. Moodle is provided free of charge under the GNU Public License, which allows users to copy, use, and modify the source code, provided that the original license is retained and derivative works are given the same license. This flexibility makes Moodle ideal for development in educational environments such as vocational schools.

Until now, the learning process at SMK Muhammadiyah 6 Leuwiliang has been dominated by conventional methods, where learning activities are conducted entirely in the classroom. Although effective in some aspects, this approach has significant weaknesses, such as limited learning time that is restricted to school hours and dependence on teacher attendance. This often results in an inefficient learning process, as students are unable to review material or access learning resources outside of class time. These limitations are a major obstacle to achieving optimal education quality. The development of a Moodle-based LMS has proven to be beneficial in improving the quality of online learning. Research by Arrahman et al. (2018), Asmawati (2015), Azizah (2019), Raharja et al. (2016), and Sari & Setiawan (2018) shows that LMS can help students learn more effectively, increase interest, and create a comfortable learning environment. Dhika et al. (2020) found that the development of e-learning through LMS can develop the interest of students and teachers, because different learning methods provide a more interesting learning experience. In addition, LMS makes it easier for teachers to impart knowledge in a more complete and structured manner.

Although LMS such as Moodle has been widely used and proven effective in previous studies, there are significant gaps in its implementation at SMK Muhammadiyah 6 Leuwiliang. The current learning process still relies on conventional methods that are limited to physical classrooms, so students cannot access materials flexibly outside of school hours. This leads to inefficiencies, such as the inability of students to repeat lessons or interact with teachers in real time without time constraints. In addition, there is no integrated system that supports direct evaluation through online quizzes, which can monitor student understanding instantly. This gap is exacerbated by the lack of adequate digital infrastructure, so that LMS innovation has not been fully adopted, even though the need for inclusive and quality learning is increasingly urgent in the digital era. Based on these gaps, the main problem in this study is: How to develop a Moodle-based Learning Management System (LMS) integrated with real-time online quiz features to improve the effectiveness of learning at SMK Muhammadiyah 6 Leuwiliang, so that students can learn flexibly without time and place restrictions, and enable direct evaluation that supports motivation and quality of education.

The novelty of this research lies in the development of “ilmuone cloud” as a specialized e-learning platform that integrates real-time online quiz features, which are not yet fully available in the LMS implementation at SMK Muhammadiyah 6 Leuwiliang. Unlike previous studies that generally focus on developing standard Moodle-based LMS without emphasizing real-time evaluation and cloud integration for maximum accessibility, this study uses the ADDIE model to create a more adaptive and inclusive solution. This provides a new contribution to the transformation of vocational learning towards the digital era, with the potential to be applied in similar schools in Indonesia, ensuring effective learning even in emergency conditions such as a pandemic.

The main objective of this research is to develop One Cloud LMS as a learning resource at SMK Muhammadiyah 6 Leuwiliang, equipped with real-time online quiz

features. This application is expected to be used as an effective e-learning medium, allowing students and teachers to interact without time and place restrictions. This development uses the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation), which utilizes information technology to improve the educational process. Thus, this study aims to make a real contribution to the transformation of learning at SMK Muhammadiyah 6 Leuwiliang towards a more inclusive and quality digital era.

II. Research Methods

This research is classified as Research and Development (R&D) aimed at developing and testing the feasibility of the IlmuOne Cloud-based Learning Management System (LMS) as a digital learning resource. The research procedure was carried out using the ADDIE development model, which consists of five stages, namely analysis, design, development, implementation, and evaluation. The ADDIE model was chosen because it has systematic stages that are oriented towards user needs and is widely used in research on the development of technology-based learning media.

This research was conducted at SMK Muhammadiyah 6 Leuwiliang, located at Komplek Amanah Asri Blok D No. 13 RT 01 RW 13, Leuwiliang Village, Leuwiliang District, Bogor Regency. The research subjects consisted of 25 teachers and 25 students who were directly involved in the learning process using LMS. In addition, product validation was carried out by expert lecturers who had competence in the field of education and learning technology, consisting of subject matter experts, media experts, and language experts.

The analysis stage was conducted to identify initial learning needs and problems encountered in the implementation of online learning. The needs analysis was carried out by distributing questionnaires to teachers and students. The results of the analysis showed that learning requires an integrated LMS system that is easily accessible and capable of supporting online learning evaluation.

The design stage focused on designing the LMS structure, interface display, learning flow, and planning key features such as material management, discussion forums, and online quizzes. At this stage, research instruments were also developed for the validation and data collection processes.

The development stage was carried out by developing an IlmuOne Cloud-based LMS in accordance with the designed structure. The developed product was then validated by subject matter experts, media experts, and language experts to assess the suitability of the content, appearance, and use of language in the LMS.

The implementation stage was carried out by applying the LMS in the learning process. Teachers and students used the LMS to access materials, complete assignments, and take online quizzes. During this stage, data on teacher and student responses is collected through questionnaires and interviews.

The evaluation stage is carried out to assess the feasibility, practicality, and effectiveness of the LMS based on the results of expert validation and user responses. The evaluation is used as a basis for improving the LMS product.

Table 1. Data Collection Techniques

No	Research Target	Method	Instrument	Participants
1	Initial needs analysis	Questionnaire	Needs analysis questionnaire sheet	25 Teachers & 25 Students
2	Validation and evaluation by subject matter experts	Questionnaire	Validation and evaluation sheet	2 Subject Matter Experts
3	Validation and evaluation by media experts	Questionnaire	Validation and evaluation sheet	2 Media Experts
4	Validation and evaluation by language experts	Questionnaire	Validation and evaluation sheet	2 Language Experts
5	Teachers' and students' responses to LMS usage	Questionnaire	Response questionnaire sheet	25 Teachers & 25 Students
6	Teachers' and students' interviews regarding LMS usage	Interview	Interview guideline sheet	5 Teachers & 5 Students

The data obtained from teachers and students consists of quantitative and qualitative data. Quantitative data is used to determine the suitability and quality of the LMS, while qualitative data in the form of suggestions, comments, and input from experts, as well as the results of interviews with teachers and students, is used as material for product improvement.

The questionnaire instrument was developed using a five-point Likert scale, as presented in Table 2.

Table 2. Scoring Scale

No	Score	Description
1	5	Strongly agree / very good / very feasible / very valid / very practical
2	4	Agree / good / feasible / valid / practical
3	3	Neutral / fairly feasible / fairly valid / fairly practical
4	2	Disagree / not feasible / not valid / not practical
5	1	Strongly disagree / very unfeasible / very invalid / very impractical

III. Results and Discussion

A. Research Results

The results of this study are the outcome of the development of IlmuOne Cloud as a learning resource at SMK Muhammadiyah 6 Leuwiliang using the ADDIE Research and Development (R&D) model. The data presented in this section has been processed, not raw data, and is presented in tabular form for ease of understanding. The results section only presents the findings without discussion.Pada Hasil dan Pembahasan setidaknya memuat:

1. Analysis Stage (Needs Analysis)

The analysis stage in the ADDIE model is the main foundation in the development of a Learning Management System (LMS). Based on a literature study, needs analysis is carried out to identify learning problems, user characteristics, and the readiness of facilities and infrastructure. Research by

Pahlevi et al. (2025) shows that the majority of high school students experience limited learning resources and are in dire need of a technology-based LMS that is easily accessible and supports audiovisual learning .

In the context of vocational schools, the need for LMS becomes more specific because learning is not only theoretical but also requires the mastery of vocational competencies. Research by Firman et al. (2021) confirms that LMS is effective as a learning resource, but its implementation is often not optimal due to limited content and system design that does not meet user needs .

Therefore, the development of IlmuOne Cloud needs to begin with an analysis of the needs of teachers and students at SMK Muhammadiyah 6 Leuwiliang so that the LMS developed is truly relevant and contextual. The analysis stage produced findings related to the needs of teachers and students for LMS-based digital learning resources.

Table 1. Results of the Analysis of Teacher and Student Needs for IlmuOne Cloud

Aspect Analyzed	Main Findings
Availability of learning resources	Digital learning resources are still limited and not yet integrated
Learning pattern	Learning is still predominantly face-to-face and lacks flexibility
LMS needs	Teachers and students require an LMS that is easy to access and well-structured
Students' learning independence	Students need media that support independent learning
Infrastructure readiness	The school has adequate devices and internet network infrastructure

Findings at this stage indicate a real need for the development of IlmuOne Cloud as a learning resource.

2. Design Stage

The design stage focuses on designing the LMS structure, learning flow, interface display, and integration of materials, assignments, and evaluations. Literature studies show that systematically designed LMSs can improve material clarity and user comfort. Fonna et al. (2022) proved that Moodle-based LMSs with structured designs obtained very valid and very practical categories based on expert and user assessments.

A good LMS design must also support independent and interactive learning. Purbohadi's (2022) research emphasizes the importance of LMS-based interactive content and SCORM standards to improve the learning experience of students compared to passive content.

Thus, the design of IlmuOne Cloud needs to include the presentation of digital material, discussion forums, assignments, quizzes, and evaluation features that are easy to use by vocational school teachers and students. The design stage produced the IlmuOne Cloud system design, which includes the learning structure, LMS features, and evaluation instruments.

Table 2. Results of the IlmuOne Cloud Design

Design Component	Design Outcomes
LMS structure	Learning materials, assignments, quizzes, discussion forums, and evaluation
Learning model	Independent and interactive learning
User interface	Simple and easy to use
Assessment instruments	Expert validation sheets and user response questionnaires

3. Development Stage

The development stage is the realization of the design that has been developed into a usable LMS product. Based on the results of a literature study, most ADDIE R&D research states that LMS developed through a systematic development stage achieves a high level of feasibility. Hardika's (2021) research shows that LMS developed with the ADDIE model is considered very practical, effective, and efficient in supporting online learning

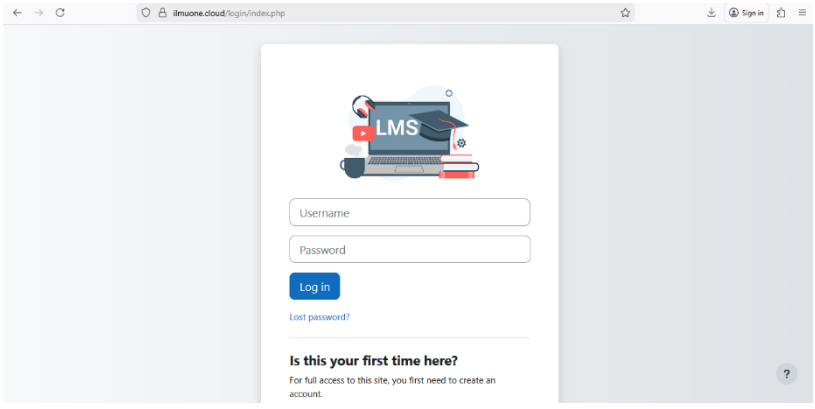
At the vocational school level, LMS development must also consider its suitability for skill competencies. Research by Nurfitriyani & Wibawa (2025) proves that Moodle-based LMS developed with ADDIE can significantly improve student competencies.

Therefore, IlmuOne Cloud needs to be developed with features that support vocational materials, independent practice, and competency-based evaluation. The development stage produced the IlmuOne Cloud product, which has undergone expert validation.

Table 3. Results of Media Expert and Material Expert Validation

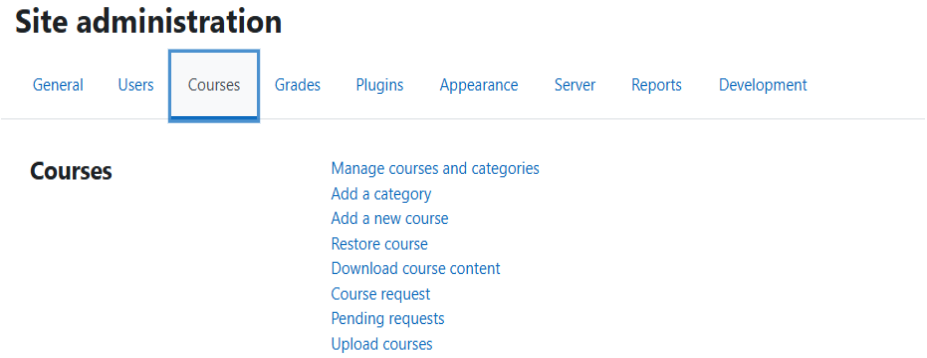
Validator	Feasibility Percentage	Category
Media expert	88%	Very feasible
Subject matter expert	90%	Very feasible

The initial display of the developed Moodle LMS can be seen in Gambar 1.



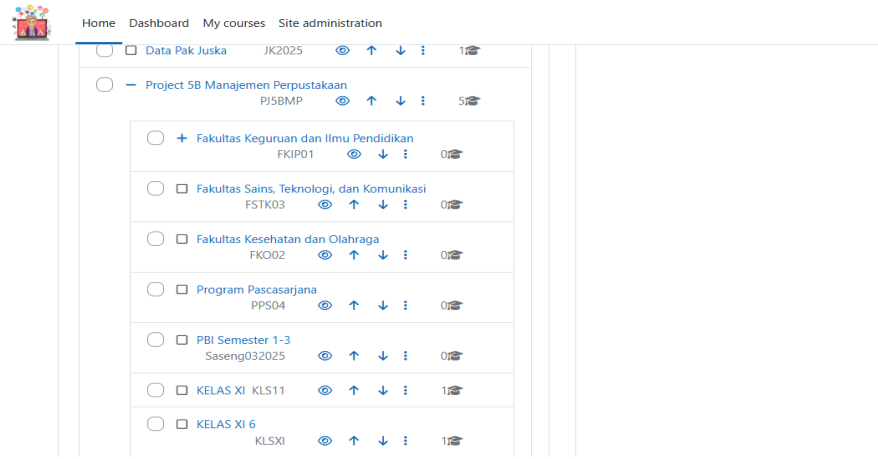
Gambar 1. E-learning Login Page

At this stage, the administrator has an important role in adding users, adding or changing courses (classes), and adding new categories (class groups). Here are some screenshots.



Gambar 2. Course Tab Add Class

After being formed, the next step in adding classes is to set up class and homeroom categories. Gambar 3. shows the results of setting up class and homeroom categories for SMK Muhammadiyah 6 Leuwiliang.



Gambar 3. Class category settings and class groups

The next step is to add users. The users referred to here are managers, teachers (who can update content), and students. Each user will have their own account that will later be used when logging into the e-learning platform. The stages of LMS development require time and precision, as well as reviewing the menus that appear for teaching and learning activities.

4. Implementation Stage

The implementation phase aims to test the use of LMS in real learning activities. A literature review shows that the implementation of LMS in schools and vocational schools has a positive impact on student engagement and learning effectiveness. Research by Junianto et al. (2021) states that the LMS implemented in vocational schools is considered feasible and able to significantly assist the learning process based on user test results .

LMS implementation also supports flexible learning and independent learning for students. Research by Ismanto et al. (2024) shows that self-directed learning-based LMS is very effective for use in vocational schools with a high level of usability.

The implementation of IlmuOne Cloud at SMK Muhammadiyah 6 Leuwiliang

is expected to support learning both inside and outside the classroom. The implementation phase produced findings related to the practicality of using IlmuOne Cloud by teachers and students.

Table 4. Teacher and Student Response Results

Respondents	Response Percentage	Category
Teachers	89%	Very practical
Students	87%	Very practical

5. Tahap Evaluation (Evaluasi)

The evaluation stage in the ADDIE model is carried out to assess the validity, practicality, and effectiveness of the developed LMS. Based on literature studies, LMS evaluation generally involves the validation of media and material experts as well as user responses. Anggriawan's (2019) research shows that the evaluated LMS obtained a category of highly valid and highly practical based on teacher and student assessments.

Evaluation also serves as a basis for improvement and further development of the LMS. Research by Sam & Idrus (2021) confirms that continuous evaluation can ensure that the LMS remains relevant and effective as a learning resource, especially in digital-based learning.

Thus, the evaluation of IlmuOne Cloud needs to be carried out formatively and summatively to ensure its quality as a learning resource in vocational schools. The evaluation stage shows that IlmuOne Cloud meets the eligibility criteria as a learning resource.

Table 5. Recapitulation of IlmuOne Cloud Evaluation Results

Aspect	Result
Feasibility	Very feasible
Practicality	Very practical
Effectiveness	Effective as a learning resource

The results of the study show that IlmuOne Cloud is considered highly feasible, practical, and effective because it was developed based on an analysis of the real needs of vocational school teachers and students. These findings are in line with the basic concept of Research and Development, which emphasizes that learning products must be developed systematically and based on user needs (Hardika, 2021).

The high feasibility in terms of media and materials indicates that the design of IlmuOne Cloud has met the principles of content suitability, ease of use, and learning integration, as emphasized in the development of ADDIE-based LMS (Fonna et al., 2022).

In addition, the high practicality of the responses from teachers and students shows that IlmuOne Cloud is capable of supporting independent and flexible learning. This is in line with the concept of self-directed learning, which states that LMS can increase students' independence and responsibility for learning (Ismanto et al., 2024).

The results of this study are in line with the findings of Firman et al. (2021), which state that LMS is effective as a learning resource because it can increase time efficiency and learning interaction. These findings are also in line with the

research by Junianto et al. (2021), which concluded that LMS in vocational schools is deemed suitable for use based on user testing.

Consistency was also found with Anggriawan's (2019) research, which states that LMS developed through R&D is categorized as highly valid and highly practical. No significant contradictions were found with previous research results, but rather reinforced the findings that ADDIE-based LMS is effective when applied in secondary and vocational school environments.

The use of IlmuOne Cloud as a learning resource is also in line with Islamic values that encourage its followers to continue seeking knowledge. This is in accordance with the words of Allah SWT in Surah Al-'Alaq verse 1:

اِقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَل

"Bacalah dengan (menyebut) nama Tuhanmu yang menciptakan."

This verse emphasizes that the learning process is an obligation that must be facilitated with adequate resources, including through the use of digital learning technologies such as LMS.

IV. CONCLUSION

This study aims to develop IlmuOne Cloud as a Learning Management System (LMS) that can be used as a learning resource at SMK Muhammadiyah 6 Leuwiliang through a Research and Development (R&D) approach using the ADDIE model. Based on the research results obtained, it can be concluded that the development of IlmuOne Cloud was carried out systematically through the five stages of ADDIE, namely analysis, design, development, implementation, and evaluation, resulting in an LMS product that meets vocational learning needs.

The analysis stage shows that the learning process at SMK Muhammadiyah 6 Leuwiliang is still dominated by conventional face-to-face learning with limited flexibility in terms of time and access to digital learning resources. Teachers and students need an integrated, easily accessible LMS-based learning system that can support independent learning. Adequate school infrastructure readiness is a major supporting factor in the development of IlmuOne Cloud as a digital learning solution.

During the design and development stage, IlmuOne Cloud was designed with a comprehensive learning structure, including materials, assignments, quizzes, discussion forums, and evaluations. Validation by media and material experts showed that the developed LMS was highly feasible in terms of appearance, ease of use, and suitability of learning content. This indicates that IlmuOne Cloud has met the feasibility standards as a technology-based learning medium and resource.

The implementation stage shows that the use of IlmuOne Cloud has received a very positive response from teachers and students. The high level of practicality indicates that the LMS is easy to use and can be integrated into the learning process without causing significant obstacles. In addition, IlmuOne Cloud is able to support flexible learning, allowing students to access materials and conduct learning evaluations anytime and anywhere.

The overall evaluation results show that IlmuOne Cloud is not only feasible and practical, but also effective as a learning resource in vocational schools. This LMS contributes to increasing learning independence, learning interaction, and evaluation process efficiency through its real-time online quiz feature. These

findings reinforce previous research results which state that ADDIE-based LMS is effective when applied to secondary and vocational education.

Therefore, IlmuOne Cloud has great potential to become an adaptive and sustainable digital learning solution at SMK Muhammadiyah 6 Leuwiliang. This development is expected to serve as a reference for other vocational schools in implementing LMS as part of learning transformation in the digital era, while also supporting the improvement of inclusive education that is oriented towards the needs of students.

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