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Chamilo LMS for web-based e-learning development in a vocational high school

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Abstract: The development of a web-based e-learning at SMK Negeri 4 Padang was initiated by the absence of a structured e-learning system at the school. This study aims to design and implement e-learning using the Chamilo Learning Management System (LMS) platform, ensuring its validity and practicality. The study employs Research and Development (R&D), adapting 3 stages of the ADDIE model, including analyzing, designing, and developing. The results of the validity test, assessed by three lecturers as media validators, show a score of 91.84%, categorized as very valid. The practicality test results show that 92.31% of teachers and 82.34% of students rated the system on the very practical category. Based on this data, the developed e-learning system at SMK Negeri 4 Padang is considered valid and practical. However, this study has not been through the broader implementation and evaluation. Therefore, it is suggested for further researchers conducting the similar studies to get it come to the whole stages of ADDIE model, confirming its effectiveness.

Keywords: Quality education; Media, information, and technology; Internet of things; Online learning

1. Introduction

A system that can support learning in all situations is essential for more effective education, such as a Learning Management System (LMS). An LMS is an application used to facilitate learning (Cheung et al., 2010). Several types of LMS platforms exist, including Moodle, Atutor, Dokeos, Chamilo, and others. Among the many available options, Chamilo LMS offers various useful features for the learning process, such as tests, discussion forums, assignments, and the ability to display learning materials in different formats (Azairok & Fathurohman, 2023). Mobile learning is also very promising for the future development of education, with mobile technology offering significant potential to create new learning experiences (Keengwe & Bhargava, 2014). An LMS is a system used to administer e-learning platforms, helping to deliver and manage educational content (Rini et al., 2024).

Chamilo is an open-source licensed Learning Management System (LMS) that converts learning materials into a web-based format. There is also a mobile version of the application, which can be accessed via smartphones. LMS applications are also referred to as Electronic Learning (E-Learning) systems. Chamilo-based LMS allows students to access learning materials and is an adaptive, efficient, and user-friendly medium for all conditions (Nasir et al., 2023). E-Learning represents an effort to transform the learning process in schools or universities into a digital format facilitated by Internet technology.

Based on observations and interviews with the deputy principal of curriculum, SMK Negeri 4 Padang is one of the state schools in Padang City that does not yet have a structured E-Learning system. However, teachers at the school currently use platforms like WhatsApp to conduct online learning. This platform makes it challenging for teachers to monitor learning activities due to the lack of a structured E-Learning system. The Chamilo LMS platform can support learning not limited by space and time. The school's infrastructure is sufficient, with a website, computer laboratories, and four servers with a network speed of 3 Mbps, which can be used for the Chamilo LMS platform. This system can assist teachers in learning, evaluating learning outcomes, and processing grades. Therefore, SMK Negeri 4 Padang faces no significant barriers to implementing E-Learning. Students from all three classes provided positive feedback on E-Learning activities (Rini et al., 2020).

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Using the Chamilo LMS, the E-learning tool effectively improved the learning outcomes of students exposed to learning evaluation gaps (Qamarya et al., 2023). Similar to other studies, the features of Chamilo-based E-Learning developed for vocational schools are very interesting and can improve student learning outcomes (Astriawati & Djukri, 2019). Mobile learning can also facilitate communication between educators and students, making students more active in class and helping them develop necessary communication skills (Rini et al., 2024). Based on these factors, innovative media not limited by space and time is required to optimize the learning process, especially for the Basics of Animation subject. One of the tools used is E-Learning via the Chamilo LMS platform, which can help teachers deliver learning materials effectively.

2. Methods

The development of web-based e-learning for vocational high school learning was conducted using the ADDIE method (Branch, 2009). The stages of implementation of web-based e-learning development that have been carried out are presented in Figure 1.

2.1 Research subjects

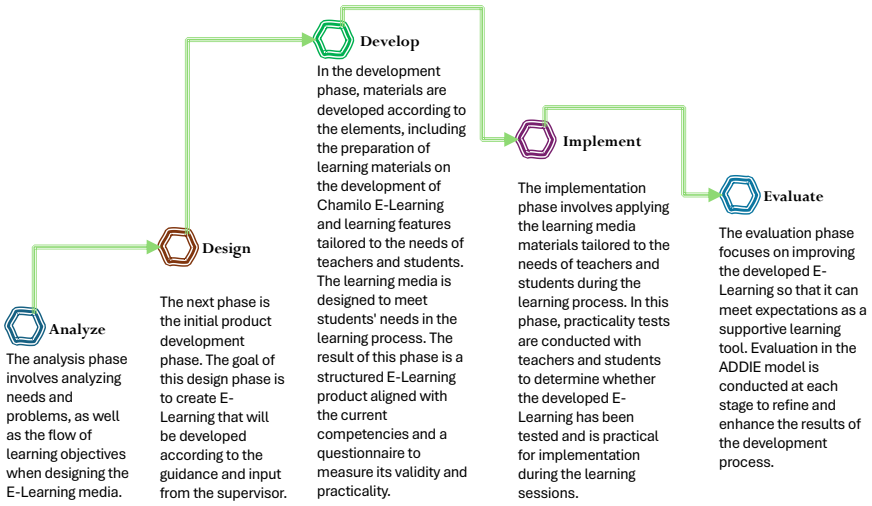
The research subjects were taken from all students of Class X Animation at SMK Negeri 4 Padang who were involved in the Basics of Animation subject during the even semester of the 2023/2024 academic year. The total number of research subjects is shown in Table 1.

Table 1. Research subject

Respondents	Total
Media Validity	3
Teacher Practicality	1
Student Practicality	31
Total	**38**

This research involves media validation and practicality testing from teachers and students in the targeted class.

Figure 1.
ADDIE Approach



2.2 Instruments

The media validity instrument is used to assess the feasibility of the designed media. This instrument for media experts contains points related to aspects of the developed media. The following is the instrument blueprint for media experts, as shown in Table 2.

Table 2.
Media expert instrument blueprint

No	Indicator	Item Numbers	Total
1	Ease of Use	1,2,3,4,5,6	6
2	Display Attractiveness	7,8,9,10,11,12	6
3	Interactivity Aspects	13,14,15,16	4
Total Items			**16**

2.3 The data analysis technique

The instruments used for data collection in this study are questionnaires detailed as follows:

2.3.1 Research instruments

2.3.1.1 Media validity test questionnaire

The media validity instrument is used to assess the feasibility of the designed media. This instrument for media experts contains points related to aspects of the developed media. The following is the instrument blueprint for media experts, as shown in Table 3.

Table 3.
Media expert instrument blueprint

No	Indicator	Item numbers	Total
1	Ease of Use	1,2,3,4,5,6	6
2	Display Attractiveness	7,8,9,10,11,12	6
3	Interactivity Aspects	13,14,15,16	4
Total items			**16**

2.3.1.2 Teacher and student practicality instruments

The practicality instrument is used to gather feedback and suggestions from teachers and students who evaluate the developed e-learning to determine its practicality. The blueprint for the teacher and student practicality instruments is shown in the following Tables 4 and 5.

Table 4. Teacher Practicality Questionnaire Blueprint

No	Indicator	Item Numbers	Total
1	Usage Conditions (Attractiveness)	1,2,3,4,5,6,7	7
2	Learning Time Effectiveness	8,9,10	3
3	Benefits	11,12,13,14	4
Total Items			**14**

Table 5. Student practicality questionnaire blueprint

No	Indicator	Item Numbers	Total
1	Learning Media	1,2,3,4,5,6,7,8	8
2	Material	9,10,11,12	4
3	Benefits	13,14,15,16	4
Total Items			**16**

2.3.2 Instrument validation phase

Before conducting the validity test with media experts and the practicality test with teachers and students, the research instruments used in these tests must first be validated by an expert in questionnaire instruments. The questionnaire instruments for validity and practicality tests will be provided to the first academic advisor as Validator 1. Once approved by Validator 1, the instrument will proceed to Validator 2, an expert in questionnaire instruments from the Informatics Education Study Program at Universitas PGRI Sumatera Barat. Validator 1's feedback for the media expert validation includes tidying up the tables, adding respondent identity, and using check marks (✓). Validator 2's feedback for the teacher-student practicality instrument validation includes improving and adjusting the statements to align with the indicators and differentiating between teacher and student statements.

3. Results and discussion

3.1 Analyze

The analysis stage is the initial stage of the eLearning development study. Activities carried out in this phase need analysis and material analysis. As for after analysis, it is obtained as follows:

3.1.1 Need analysis

This stage was carried out by conducting a need analysis to discover the fundamental problems faced in learning. This was done to discover what difficulties teachers often experience in teaching material to students and the extent to which students are involved or interested in learning.

3.1.2 Curriculum analysis

Curriculum analysis was carried out by analyzing the elements in the Basics of Animation subject module with the teacher, aiming to identify the material used in the Basics of Animation subject at SMK Negeri 4 Padang. This is done to determine the elements that will be developed in E-learning.

3.2 Design

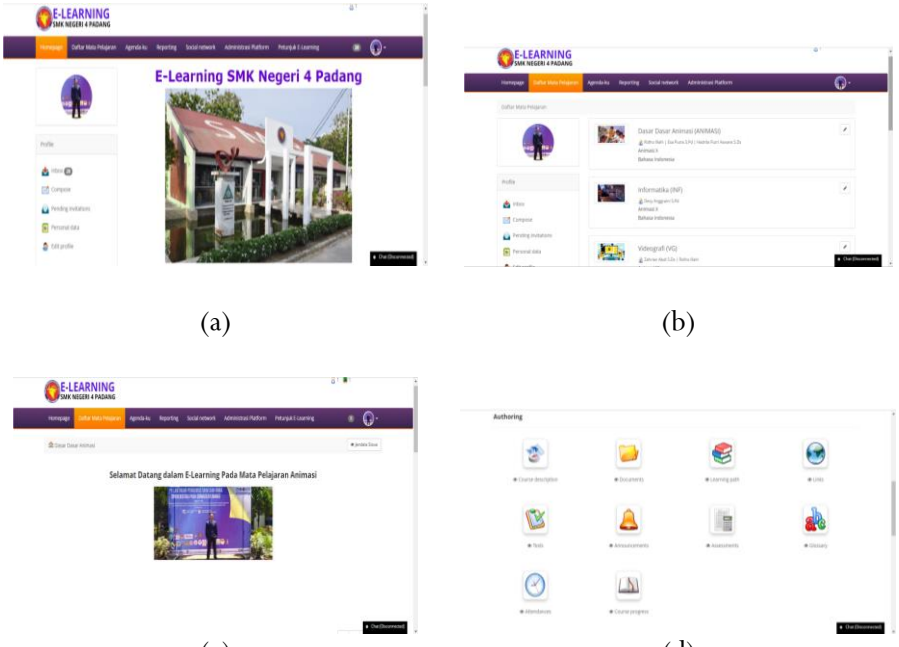
The Design Stage is to design E-Learning using the Chamilo LMS Platform, including the learning objectives.

(a) (b) (c) (d)

Figure 2. (a) Login view, (b) Homepage view, (c) Courses list, and (d) Agenda view

3.3 Develop

The results of the website development that has been improved based on the input of suggestions and improvements based on expert criticism are presented in Figure 3. The e-learning website can be accessed at the web address https://smkn4padang.lms-awak.my.id/. Each teacher and student has their account.



(a) (b) (c) (d)

Figure 3. (a) Homepage display, (b) Lesson list view, (c) Introduction to lesson list, and (feature available in the lesson list

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The homepage or homepage on E-Learning is the display seen by users; this page displays profile info and topics on E-Learning (figure 3. a). The Subject List display is displayed in E-Learning after the user logs in. The lesson list display displays the division into classes and subjects according to the teachers who teach those subjects. There are several subjects, namely Informatics, Animation Basics, and Videography. Researchers tested E-Learning on the Basics of Animation subject in class X Animation (Figure 3. b). The next page is available in the Animation Basics subject, which contains an introduction to the subject and the features used for learning (Figure 3. c). The next page is available in the Animation Basics subject, which contains an introduction to the subject and the features used for learning (Figure 3.d).

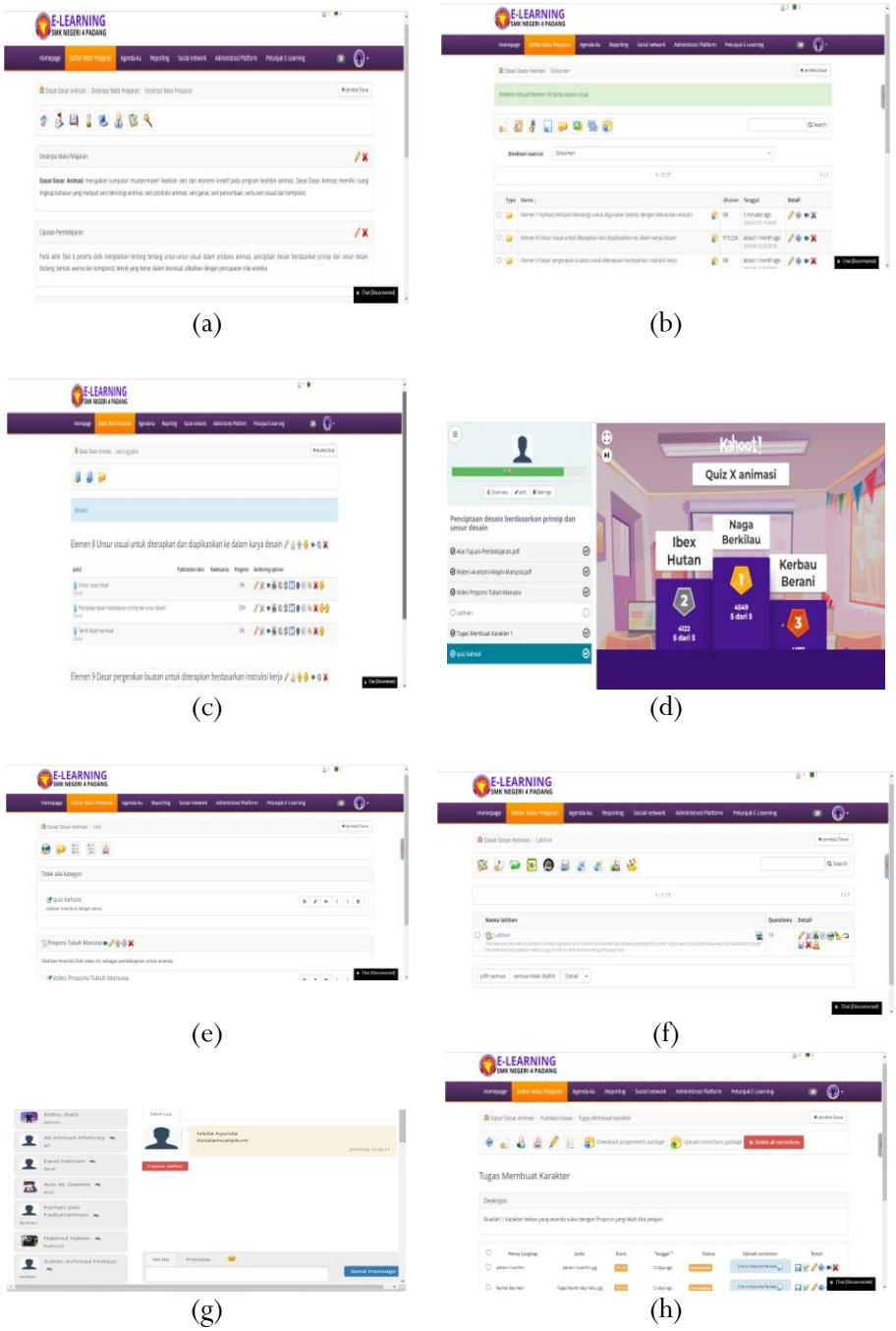

Figure 4. (a) Features course description feature display, (b) Documents feature display, (c) Learning path feature display, (d) Learning path feature display, (e) Feature display link, (f) Test feature display, (g) Chat feature view, (h) Assignment feature view

The next page is available in the Animation Basics subject, which contains an introduction to the subject and the features used for learning. The course description feature describes subjects, explaining learning outcomes that students can see and read. The appearance of the Course description feature

can be seen in Figure 4.a. The Document feature is used to store learning-related materials or documents, such as storing learning material files and assignments completed by students. Learning material is arranged based on elements (Figure 4. b). Learning paths create a sequence of learning activities following the flow of learning objectives in one place, making it easier for students to follow the learning and complete the tasks given (figure 4. c). The Link feature connects a link, such as researchers connecting YouTube and Kahoot links (Figure 4. e). The Test feature is used to provide practice questions or daily test questions to students. The Test feature has various options, namely multiple choice, matching, and many more options (Figure 4. f). The Chat feature provides feedback between students and teachers (Figure 4. g). With the chat feature, students can ask questions during the learning process. The Assignments feature is used to collect assignments so that there is evidence that the student has collected the assignments given (Figure 4. h). Students can upload PDF, JPG, PNG, and other formats using the Assignments function.

The Social Network display is a page that connects users with other users by becoming friends first; for example, subject teachers who teach in class X Animation can connect with the head of department and homeroom teacher so that the head of department and homeroom teacher can find out information about class X Animation. The results of this media validity are aimed at finding out the opinions of media experts regarding the feasibility of developing web-based E-Learning using the Chamilo LMS Platform. The following media validity results can be seen in the table 6.

Table 6. Media validity results

	(%)	Categories
Ease of use	92.71	Very valid
Appeal of appearance	90.63	Very valid
Aspect of interactivity	92.19	Very valid
Average	**91.84**	**Very valid**

Based on the results of the validity of the E-Learning media assessed by the media expert validator, the media was declared "very valid" with a score of 91.84%. This score is included in the validity category >75% - 100%, indicating that the media is feasible and of high quality for use. The range of validity values used in this assessment divides the categories into "Very Valid" (>75% - 100%) and "Not Valid" (0% - 25%). Thus, the E-Learning media assessed has a very high level of validity and is feasible for use in relevant contexts. Teacher practicality is carried out to determine whether the development of web-based E-Learning using the Chamilo LMS Platform is practical. The following media Pratical results can be seen in Table 7.

Table 7. Teacher practicality

Indicator	(%)	Categories
Usage (Engaging)	94.64	very practical
Time Efficiency in Learning	87.50	very practical
Benefits	94.79	very practical
Average	**92.31**	**very practical**

Based on the practicality assessment by the Basic Animation subject teacher, the web-based E-Learning developed using the Chamilo LMS platform was declared "very practical." This assessment is based on the practicality category, which measures the range of >75% to 100% as "very practical." In the practical results, teachers responded with a percentage of 92.31%, indicating that this platform is straightforward to use and effective in supporting the learning process. Therefore, developing this e-learning is practical and feasible to apply in animation learning. The practicality test of E-Learning using the Chamilo LMS Platform also requires input in the form of student responses. The results of student practicality can be seen in the following Table 8.

Table 8. Student practicality

Indicator	(%)	Categories
Learning Media	83.20	very practical
Material	79.95	very practical
Benefits	83.85	very practical
Average	**82.34**	**very practical**

Based on the analysis of the level of practicality of E-Learning with the Chamilo LMS platform assessed by students of class X Animation, this platform is declared "very practical." The practicality category refers to the 75-100% range, indicating a high practicality level. From the practicality results table, students were assessed with a percentage of 82.34%, which is included in the "very practical." Thus, the Chamilo LMS is considered easy for students to use and can support the learning process well, especially in animation subjects. In conclusion, this LMS is considered feasible and practical to be applied in the student learning environment.

4. Conclusion

Research produces Web-based E-Learning products and web-based E-Learning development using a development model Research and Development (R&D) with the ADDIE development model with the Analysis stages (analysis), Design, Development, Implementation, Evaluate. The results of the E-Learning validity test using the Chamilo LMS Platform showed that the E-Learning was declared very valid. Media validity was 91.84. Thus, it can be concluded that from the results of the media validity test, the development of web-based E-Learning using the Chamilo LMS Platform was declared very valid. The practicality test of E-Learning using the Chamilo LMS Platform showed positive results. Animation Productive Teachers at SMK Negeri 4 Padang said that E-Learning using the Chamilo LMS Platform had a practicality of 92,31%, a very practical category, and student practicality of 82.34%.

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Declarations

Author contribution

Faiza Rini: Conceptualization, methodology, Validation, data curation, and writing -original draft. Ang Ling Weay: Investigation, resources, writing -review & editing. Rini Novita and Muhammad Ridho: Writing -original draft, software, formal analysis, investigation and data curation.

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Conflict of interest

No conflicts of interest in this research.

Ethical clearance

The conduct of research involving human subjects. Prior to the research, the management and staff of State Vocational High School 4 Padang agreed to be informants in this research. They were also willing to have their data used as the basis for the LMS and material for this published article.

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