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Development of Content Differentiated Blended Learning Model with Media Learning Management System to Improve Critical Thinking Skills

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Abstract

Critical thinking skills will help students solve problems, both simple difficulties and issues that are highly complex. Students must possess critical thinking skills because the ability to solve problems that are right, logical, and fast in critical thinking skills will help students prepare themselves to face personal and career challenges in the future. This study aims to design a content-differentiated blended learning model with a media learning management system to improve the critical thinking skills of high school students in high school economics. This study uses the Design-Based Research (DBR) method aimed at grade XI students of State Senior High Schools in Sukoharjo. The study subjects were economics teachers at State Senior High Schools in Sukoharjo and 143 State Senior High School students in Sukoharjo. The study results showed that students' critical thinking skills had increased from the first cycle of implementation to the second cycle. The analysis results were found in observations during learning using the Content Differentiated Blended Learning model with the Media Learning Management System.

Keywords: *Learning Management System, Design-Based Research, Content Differentiated Blended Learning, Critical Thinking Skills.*

Introduction

Students must have critical thinking skills to fulfill life skills. Critical thinking skills will help students solve problems, both simple difficulties and issues that are highly complex. The truth about something that happened a long time ago and new information will always be obtained by students when they have good critical thinking skills (Su et al., 2016). Critical thinking skills are essential for students because they are one of the main goals of education to prepare students to have the ability to identify and analyze various sources of information, show previously owned knowledge, make connections, and draw conclusions (Edwards, 2007; Welch et al., 2015). Students must possess critical thinking skills because the ability to solve problems that are right, logical, and fast in critical thinking skills will help students prepare themselves to face personal and career challenges in the future (Robbins & Judge, 2017).

Another thing related to the success of learning practices with Differentiated Instruction strategies to overcome problems related to students' critical thinking skills can be done by teachers by preparing learning plans creatively, innovatively, and strategically to solve problems in complex learning so that they are easier to understand and accept by students based on their respective learning needs (Black et al., 2018; Chizhik & Chizhik, 2018; Grecu, 2023; Yuen et al., 2022). Another thing that teachers can do for the success of Differentiated Instruction practices to overcome problems related to critical thinking skills is to provide concrete examples and various learning resources and media that can help students overcome challenges and confusion in learning, provide alternative learning resources that can be used by students and teachers to encourage students' interest in following the learning process (Grecu, 2023). There are several alternatives

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that teachers can use in the practice of Differentiated Instruction strategies, one of which is using the Learning Management System (LMS).

Learning Management System (LMS) media allows learning to occur for students anytime and anywhere. LMS as an e-learning media makes it easier for teachers to monitor student activities because LMS can provide various learning resources in the form of text, video, audio, or animation) and is connected to other internet-based sources. In addition, LMS media is also an alternative in providing structured assignments and quizzes in an interesting form, and it can provide a discussion forum that can be used by teachers and students in asynchronous learning. Another interesting thing that can be utilized from LMS media is that it can be an alternative solution in synchronous learning (teachers and students access the system simultaneously and in real-time) so that they can communicate directly or asynchronous learning (teachers and students access the system at different times) (Widodo, 2017). Studies on the use of LMS in learning that have a positive impact on critical thinking skills have been conducted by several researchers (Beatty & Ulasewics, 2006; Kelley et al., 2016; McGill & Klobas, 2009; Weaver et al., 2008). Several positive results related to the use of LMS as a learning medium have not been optimally utilized in economics subjects and are still rarely used, considering that there are several limitations to the features of LMS that can be used in economics learning. This study aims to design a content-differentiated blended learning model with a media learning management system to improve the critical thinking skills of high school students in the subject of high school economics.

Literature Review

Today's human life cannot be separated from technology. Information and communication technology development is massive, increasing the number of human dependencies on technology. This also happens in educational services that have begun to maximize the use of technology in them (Shaltoni et al., 2015). The use of technology in educational services is shown by the increasing number of academic units that use a Learning Management System (LMS)-based learning system. The use of LMS in learning is considered to facilitate the implementation of learning that can be carried out anytime and anywhere so that many educational units shift from face-to-face to distance and online education.

The flexibility offered by learning using LMS makes learning more varied and enjoyable. Teaching platforms that are currently often used in educational environments to facilitate e-learning are Moodle, Blackboard, Sakai, Canvas, Atutor, Google Classroom, and LMS applications (Dogoriti & Pange, 2014; Lisnani et al., 2020). E-learning based on a learning management system is one solution for effective continuous learning. It offers many opportunities to learn outside the traditional learning methods. This can be seen from the use of LMS, which can increase the reach of learning to thousands of students, facilitate more intense interactions between students and education, collaborative learning, and encourage teachers in terms of planning and designing the learning process (Bansode & Kumbhar, 2012).

Another advantage offered by LMS used in learning is content management, which can be used by users (teachers) to post text links, upload or download files, user account management for student access to courses and learning content, communication through discussion forums, chats, private messages, emails, evaluation through questions and quizzes and assignments that students can do (Kaewsaiha, 2019). Using LMS in learning can help teachers maximize learning skills facilities, productivity tools to support education, and communication tools that are more interesting and communicative to students (Kaewsaiha, 2019). Using LMS in learning by teachers can make learning more interesting and can be done in various places and devices owned by students, such as tablets, laptops, smartphones, and so on.

Methods

The Design-Based Research (DBR) method is aimed at class XI students of State Senior High Schools in Sukoharjo. The research subjects involved in the preliminary research were economics teachers at State Senior High Schools in Sukoharjo and 432 State Senior High School students in Sukoharjo. This study uses the Design-Based Research (DBR) type of research, which means that DBR research is research that

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combines empirical educational research with designs built on theory as research output (Akker et al., 2006; Bekker, 2004; Edelson, 2022; Griffith Institute for Higher Education (GIHE), 2008). Design Based Research (DBR) is a type of research that has a dual purpose, namely to improve learning practices and develop and advance theories based on authentic learning carried out in the classroom (Mckenney & Reeves, 2015; Oh & Reeves, 2014). Design-Based Research (DBR) consists of four phases in its application (Amiel & Reeves, 2008), namely: (1) the problem analysis phase carried out by researchers in collaboration with practitioners; (2) solution development with a theoretical framework; (3) evaluation and testing of solutions in practice; and (4) documentation and reflection to produce design principles. These phases are more clearly described in Figure 1 as follows:

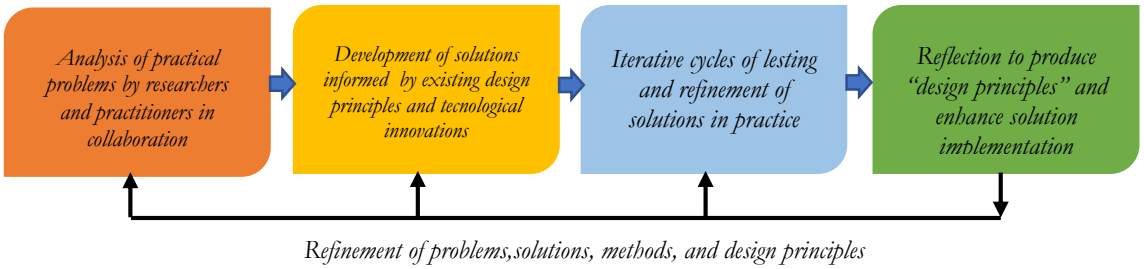

Figure 1 Design Based Research Implementation Phase

Source: (Amiel & Reeves, 2008)

Result and Discussion

Development Stage

At this stage, several stages are carried out with the objectives of (1) developing a prototype, (2) testing expert judgment, and (3) testing the Differentiated Instruction Approach model based on the Learning Management System (LMS) in economics learning in high school (Dogan & Dikbıyık, 2016; Jusoh et al., 2018). The product development stage in Design-Based Research (DBR) research is equated with the prototype development and trial stage, the second stage of the DBR research procedure (Amiel & Reeves, 2008) related to development solutions informed by existing design principles and technological innovations. At this product development stage, a product has been produced in the form of a prototype of the Content Differentiated Blended Learning Model with Media Learning Management System, which has gone through several stages, namely: Prototype of the Content Differentiated Blended Learning Model with Media Learning Management System, test results by expert judgment, and observation results of the trial of the Content Differentiated Blended Learning Model with Media Learning Management System.

The learning media developed in this study is a Learning Management System (LMS) based learning media, which contains non-cognitive diagnostic analysis tools, grouping of student learning styles, learning modules according to VARK learning styles, and formative evaluation for students. The LMS media developed is named "Rumah Pintar Ekonomi," a medium teachers and students use to implement economic learning both synchronously and asynchronously. In the LMS media, teachers can provide economic learning materials according to student learning needs, conduct non-cognitive diagnostic analysis, carry out discussions for asynchronous learning, and conduct formative and summative evaluation tests. Students can use LMS to learn economic material according to their respective learning styles, conduct non-cognitive diagnostic analysis, carry out discussions for asynchronous learning, and conduct formative and summative evaluation tests.

LMS Learning Media already has its own hosting license or website address, which is https://rumahpintarekonomi.com/. The Smart House of Economics LMS learning media display can be seen as follows.

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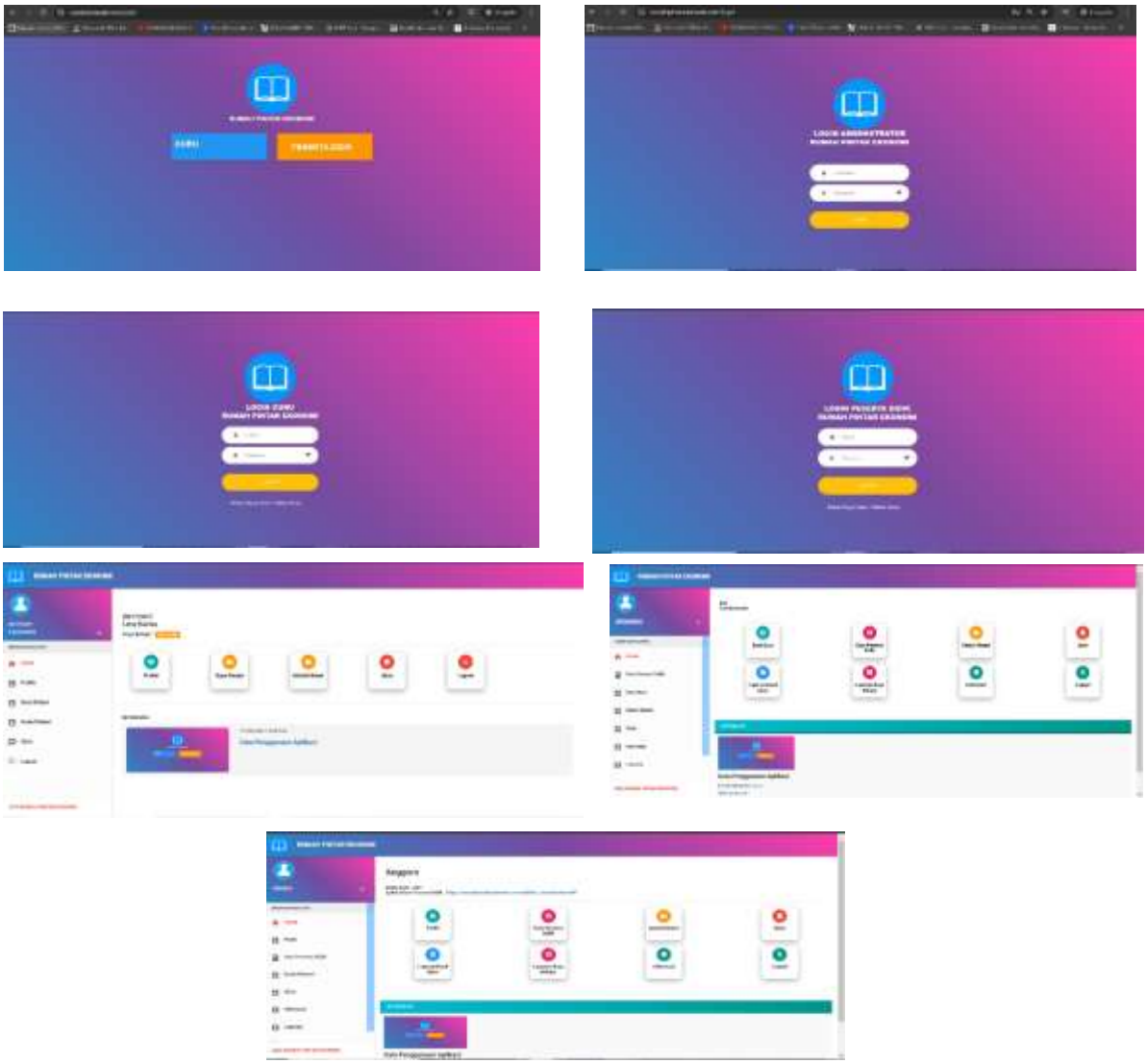

Figure 2. Rumah Pintar Ekonomi LMS Display

Product Prototype Development

Developing a research product prototype produced at the product development stage requires validation to determine its relevance to the research objectives to be achieved. At this stage, validation of the content of the VARK learning module material, non-cognitive diagnostic analysis tools, and LMS as a learning medium has been carried out to support the Content Differentiated Blended Learning model with the Media Learning Management System. Content validation aims to test the feasibility or relevance of the content of an instrument with research objectives through rational analysis carried out by expert judges. The instruments in this study that expert judges validated were the economics learning module with the VARK learning style, non-cognitive diagnostic analysis tools, and LMS as an economics learning medium.

Expert Judgment

Expert judges in the Content Differentiated Blended Learning model with the Media Learning Management System include notes/comments/input/suggestions.

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Table 1. Recap/Comments/Notes/Input/Expert Judges' Suggestions

No	***Expert Judges***	**Comments/Feedback/Notes/Suggestions**	**Information**
1.	Economic Learning Expert	• The material follows the CP, TP, and ATP for the economics subject, price index, and inflation material. • The media for delivering the material has four learning styles, but the reading/listening style module needs to be clarified. If the learning style is a combination of reading and listening, then two versions need to be made, or when learning by reading, while there is sound (listening)	**Revised** The revision was carried out by explaining to expert judges the learning module for the reading/listening learning style, which is more directed towards the reading learning style because, for the listening learning style, the direction is almost the same as the auditory one.
2.	Expert judges Applied Linguistics and Language Assessment for non-cognitive diagnostic analysis tools.	Quite adequate and operational, suitable for use in research	-
3.	Learning Media Expert Learning Management System (LMS)	The LMS is innovative and can be developed into a Learning Content Management System (LCMS).	-

Source: processed data, 2024

Product Trial Results

The implementation of the Content Differentiated Blended Learning model trial with the Media Learning Management System, which is the second stage of the iterative cycles of learning, was carried out in two learning cycles.

Model Feasibility Test Results

The feasibility of the model in this study was tested through three phases, namely testing conducted by experts (expert judgment), testing the readability of the VARK learning module, testing the readability of non-cognitive diagnostic analysis tools, and testing the ease of use of the LMS from the Content Differentiated Blended Learning Model with Media Learning Management System to Improve Critical Thinking Skills.

Economic Education Expert

Validity testing by economic education experts was carried out by constructing 21 statements arranged into a previous validation instrument. This can be seen in Table 2 below.

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Table 2. Validity Test Results

4	4	4	4	3	3	3	9	9	1	Very High
5	4	3	3	3	2	2	7	9	0.777777778	High
6	4	4	4	3	3	3	9	9	1	Very High
7	4	4	4	3	3	3	9	9	1	Very High
8	4	4	4	3	3	3	9	9	1	Very High
9	4	4	4	3	3	3	9	9	1	Very High
10	4	3	3	3	2	2	7	9	0.777777778	High
11	4	4	4	3	3	3	9	9	1	Very High
12	4	4	4	3	3	3	9	9	1	Very High
13	4	4	3	3	3	2	8	9	0.888888889	Very High
14	4	3	4	3	2	3	8	9	0.888888889	Very High
15	4	4	4	3	3	3	9	9	1	Very High
16	4	4	3	3	3	2	8	9	0.888888889	Very High
17	4	4	4	3	3	3	9	9	1	Very High
18	4	3	3	3	2	2	7	9	0.777777778	High
19	4	4	4	3	3	3	9	9	1	Very High
20	4	4	3	3	3	2	8	9	0.888888889	Very High
21	4	4	4	3	3	3	9	9	1	Very High

Keterangan:	
0.8 - 1	Very High Validity
0.60 - 0.79	High Validity
0.40 - 0.59	Midle Validity
0.20 - 0.39	Low Validity
0.00 - 0.19	Very Low Validity

Source: processed data, 2024

The results of the validity test in Table 2 above show that the V value of most items using the Aiken validity formula falls into the very high criteria with a maximum coefficient of 1. There are only three items whose V value is 0.777, which is interpreted as a high criterion. This can be used to reference that the items in the economic learning module with the VARK learning style have good content validity and support the validity of the overall instrument content.

Learning Media Expert

In the validity test section by learning media experts, testing was carried out by experts to see the LMS media construct used as a medium in economic learning with 26 validation instrument items that had been prepared previously. The results of the validity score calculation given by experts and processed were obtained according to Table 3 below.

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Table 3. Results of Media Content Validity Calculations by Learning Media Experts

No	n1	n2	n3	S1	S2	S3	Total Item (∑s)	n (c-1)	$V = \frac{\sum s}{n\,(c-1)}$	Kriteria
1	4	4	4	3	3	3	9	9	1	Very High
2	4	3	3	3	2	2	7	9	0.777777778	High
3	4	4	4	3	3	3	9	9	1	Very High
4	4	4	4	3	3	3	9	9	1	Very High
5	4	3	4	3	2	3	8	9	0.888888889	Very High
6	4	4	4	3	3	3	9	9	1	Very High
7	4	4	4	3	3	3	9	9	1	Very High
8	4	4	3	3	3	2	8	9	0.888888889	Very High
9	4	4	4	3	3	3	9	9	1	Very High
10	4	3	4	3	2	3	8	9	0.888888889	Very High
11	4	4	4	3	3	3	9	9	1	Very High
12	4	3	4	3	2	3	8	9	0.888888889	Very High
13	4	4	4	3	3	3	9	9	1	Very High
14	4	3	4	3	2	3	8	9	0.888888889	Very High
15	4	4	4	3	3	3	9	9	1	Very High
16	4	4	4	3	3	3	9	9	1	Very High
17	4	4	4	3	3	3	9	9	1	Very High
18	4	3	4	3	2	3	8	9	0.888888889	Very High
19	4	3	3	3	2	2	7	9	0.777777778	High
20	4	4	4	3	3	3	9	9	1	Very High
21	4	4	4	3	3	3	9	9	1	Very High
22	4	3	4	3	2	3	8	9	0.888888889	Very High
23	4	4	3	3	3	2	8	9	0.888888889	Very High
24	4	3	4	3	2	3	8	9	0.888888889	Very High
25	4	4	3	3	3	2	8	9	0.888888889	Very High
26	4	4	4	3	3	3	9	9	1	Very High

Keterangan:	
0.8 - 1	Very High Validity
0.60 - 0.79	High Validity
0.40 - 0.59	Midle Validity
0.20 - 0.39	Low Validty

Source: processed data, 2024

The results of the analysis on the content validity of the LMS used as a medium for economic learning show that the V value obtained by measuring validity using the Aiken formula shows that most of them have a coefficient of 0.888 and are included in the very high category. Of the 26 items measured, only two received a coefficient of 0.77, which is included in the high criteria. It can be interpreted that the LMS as a learning medium has good content validity, is user-friendly (easy to use), and is feasible to be applied in learning.

Expert in Applied Linguistics and Language Assessment

Applied Linguistics and Language Assessment experts in this section tested constructs related to statement items used to carry out the non-cognitive diagnostic analysis stages. Applied Linguistics and Language Assessment experts tested seven items, and the results of calculating the validity score of the instrument can be seen in Table 4.

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Table 4. Results of Content Validity Calculation of Non-Cognitive Diagnostic Analysis Instruments by Applied Linguistics and Language Assessment Experts

No	n1	n2	n3	S1	S2	S3	Total Item (∑s)	n (c-1)	$V = \frac{\sum s}{n\,(c-1)}$	Kriteria
1	4	4	4	3	3	3	9	9	1	Very High
2	4	4	4	3	3	3	9	9	1	Very High
3	4	4	4	3	3	3	9	9	1	Very High
4	4	4	3	3	3	2	8	9	0.888888889	Very High
5	3	3	3	2	2	2	6	9	0.666666667	High
6	4	4	4	3	3	3	9	9	1	Very High
7	4	4	4	3	3	3	9	9	1	Very High
Keterangan:										
0.8 - 1				Very High Validity						
0.60 - 0.79				High Validity						
0.40 - 0.59				Midle Validity						
0.20 - 0.39				Low Validity						
0.00 - 0.19				Very Low Validity						

Source: processed data, 2024

The results of the validity data analysis from the Applied Linguistics and Language Assessment experts show that the V value mostly has a coefficient value ≥ 0.8, which can be interpreted as a very high coefficient. Of the seven items analyzed, only 1 item with a coefficient value of 0.67 fell into the high criteria. It can be interpreted that the items in the non-cognitive diagnostic analysis tool have good content validity and can support the validity of the instrument content as a whole.

The readability test of the VARK learning module was conducted by allowing respondents to read and understand the VARK learning module for 3 days. The next step was for respondents to fill out the readability test instrument that the researcher had prepared. The results of the readability of the VARK learning module can be seen in Table 5 below.

Table 5. Results of the Readability Test of the VARK Module for Economics Learning for Grade XI High School

No	Criteria	Easy to understand	It's quite easy to understand	Difficult to understand
		%	%	%
1.	The language used in the learning modules is easy to understand (vocabulary, sentences, and paragraphs)	83,50	16,50	0
2.	The font size and writing style used in the learning module are apparent, making it easier for readers to understand the material.	91,60	8,4	0
3.	The broad line spacing used makes it easier for readers to read the learning module	85,10	14,90	0
4.	In the learning module developed, there are no writing errors	90,60	9,40	0
5.	Reader understanding is supported by a good systematic presentation in the learning module, making it easier for readers to understand.	86,70	8,65	4.65
6.	Tables, images, and curves presented in the learning module make it easier for readers to understand the contents of the learning module.	88,30	9,80	1,90
7.	The activities to be carried out in the learning module are well understood by the reader.	81,30	15,40	3,30

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8.	The desired learning targets in the learning module are easy for readers to understand.	85,60	14,40	0
9.	The layout displayed in the VARK learning module is attractive.	90,50	9,50	0
10.	The VARK learning module has a cover that attracts the reader's attention.	80,30	17,65	2.05

Source: processed data, 2024

Table 5 above shows that most respondents who read the VARK learning module regarding language, systematics, and book layout for implementing the Content Differentiated Blended Learning model with the Media Learning Management System are good and easy to understand. Therefore, it can be interpreted that the VARK learning module for learning with the Content Differentiated Blended Learning model with the Media Learning Management System to Improve Critical Thinking Skills is feasible to use and easy to understand by grade XI students in economics subjects in high school.

The ease of use (user-friendly) test was also carried out after the LMS improvements were carried out by researchers based on input from learning media experts. The visual appearance and software engineering aspects are things that researchers try to examine from respondents by conducting the ease of use test. The ease of use (user-friendly) test allowed respondents to try using the Rumah Pintar Ekonomi LMS learning media as an economics learning media. In this ease test, respondents were allowed to use the media for three days, which is expected to provide a good picture for respondents regarding the use of the Rumah Pintar Ekonomi LMS as an economics learning media that will be implemented. After the trial, respondents were asked to fill out the prepared ease-of-use (user-friendly) test instrument. The analysis results of the ease of use (user-friendly) test can be seen in Table 6 below.

Table 6. Results of the Ease of Use (User Friendly) Test of the Smart House of Economics LMS

No	Criteria	In accordance	Quite Appropriate	Less Suitable
		%	%	%
1.	Suitability of display color selection on the Smart House of Economics LMS	95,75	4,25	0
2.	Suitability of display color selection on the Smart House of Economics LMS	92,25	7,75	0
3.	Button placement accuracy and layout consistency based on patterns in the Smart Home Economy LMS	87,90	12,10	0
4.	The attractiveness of the Smart House Economics LMS design	92,80	7,20	0
5.	Suitability of the image display presented on the Smart House of Economics LMS	86,60	13,40	0
6.	Creativity and innovation in learning media LMS Rumah Pintar Ekonomi	93,25	6,75	0
7.	Ease of operation of the Smart House Economy LMS	90,60	9,40	0
8.	Smart House Economics LMS can be used many times (Reusability)	91,30	8,70	0
9.	Smart House Economics LMS can be managed easily (Maintable)	84,25	15,75	0

Source: processed data, 2024

Based on the data analyzed above, it was found that most respondents stated that the Rumah Pintar Ekonomi LMS media, in terms of visual appearance and software engineering aspects, were appropriate

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and easy to use. Therefore, the Rumah Pintar Ekonomi LMS as a media in the Content Differentiated Blended Learning model with the Media Learning Management System is feasible and easy to use in economics learning in high school.

Model Effectiveness Test Results

The implementation of the effectiveness test of the model aims to measure the effectiveness of economic learning using the Content Differentiated Blended Learning model with the Media Learning Management System to Improve Critical Thinking Skills. The research respondents were four teachers with 143 students divided into four classes in four different schools. All students took part in the pre-test and post-test stages during the treatment process or model cycle in class. The results of the pre-test and post-test of students in implementing the Content Differentiated Blended Learning model with the Media Learning Management System to Improve Critical Thinking Skills in economic learning for class XI senior high school can be explained as follows.

Post Test Result

At this stage, the pre-test data is an initial picture of students' critical thinking skills obtained from tests on economic subjects carried out before the treatment or action of the study. The post-test results on the indicators provide a simple explanation and show an increase in the critical thinking skills of students who were previously in the inferior categories. However, after the post-test, the results were included in the sound and excellent categories with a percentage of 92.3%, which can be seen in Table 7.

Table 7. Indicator Achievements Provide Simple Explanations After Model Implementation

No	Criteria	Amount	Percentage
1	Very well	108	75,52%
2	Good	24	16,78%
3	Pretty good	11	7,69%
4	Not good	0	0
5	Very Poor	0	0

Source: processed data, 2024

N	:	143
Criteria		
Very well	:	81-100;
Good	:	61-80;
Pretty good	:	41-60;
Not good	:	21-40;
Very Poor	:	0-20;

The post-test results on the basic skills-building indicator also showed positive changes after implementing the Content Differentiated Blended Learning model with the Media Learning Management System. The students' characteristic thinking skills were previously only in the very poor and poor categories. However, after the implementation of the model, it increased to good and very good with a percentage of 94.40%. This can be seen in Table 8 below.

Table 8. Indicator Achievements Provide Simple Explanations After Model Implementation

No	Criteria	Amount	Percentage
1	Very well	98	68,53%
2	Good	37	25,87%
3	Pretty good	8	5,59%

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4	Not good	0	0
5	Very Poor	0	0

Source: processed data, 2024

The post-test results on the indicator of making conclusions show a positive trend of change in students. This is supported by an increase in the percentage of students' ability to make conclusions, from previously only being in the terrible and less good criteria to being in the good and excellent criteria with a percentage of 86.80%. This can be seen in the following table 9.

Table 9. Indicator Achievements Making Conclusions After Implementing the Model

No	Criteria	Amount	Percentage
1	Very well	87	60,83%
2	Good	37	25,97%
3	Pretty good	19	13,28%
4	Not good	0	0
5	Very Poor	0	0

Source: processed data, 2024

The post-test results on the indicator of making further explanations show a positive trend of change in students. This is supported by an increase in the percentage of students' ability to make further explanations, from previously only being in the terrible and less good criteria increasing to being in the good and excellent criteria with a percentage of 88.80. This can be seen in the following table 10.

Table 10. Indicator Achievements Making Conclusions After Implementing the Model

No	Criteria	Amount	Percentage
1	Very well	95	66,43%
2	Good	32	22,37%
3	Pretty good	16	11,18%
4	Not good	0	0
5	Very Poor	0	0

Source: processed data, 2024

The post-test of students on the indicators of making estimates and integration also experienced positive changes with an increase in student criteria on the good and excellent criteria with a percentage of 90.20%. This can be seen in the following table 11.

Table 11. Achievement of Indicators for Making Estimates and Integration After Model Implementation

No	Criteria	Amount	Percentage
1	Very well	88	61,53%
2	Good	41	28,67%
3	Pretty good	14	9,79%
4	Not good	0	0
5	Very Poor	0	0

Source: processed data, 2024

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Prerequisite Test

Prerequisite tests are conducted to meet the requirements before the analysis test is performed. Prerequisite test testing is conducted to determine whether the data obtained from the population has a normal distribution by testing the population data through a normality test. Prerequisite tests are conducted using the SPSS version 26 application using the Kolmogorov-Smirnov Normality Test with a significance value of 0.05. The normality test was performed with Kolmogorov-Smirnov; if the significance value gets a result greater than (> 0.05), then it can be categorized that the population used for the study has a normal distribution (standard = sig.> 0.05). The results of the analysis of the prerequisite test related to the pre-test and post-test data on critical thinking skills can be seen in the following table 12.

Table 12. Results of Pre-Test and Post-Test Normality Tests

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		143
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	5.96846191
Most Extreme Differences	Absolute	.069
	Positive	.069
	Negative	-.068
Test Statistic		.069
Asymp. Sig. (2-tailed)		.096[c]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Source: processed data, 2024

This shows that the results of the normality test of the pre-test and post-test data have a significance of 0.096 or greater than 0.05, so the pre-test and post-test data are declared to be normally distributed.

Paired T-Test Results

The effectiveness test was conducted to determine whether the Content Differentiated Blended Learning model with the Media Learning Management System positively impacts students' critical thinking skills in the economics subject of grade XI Senior High School. The effectiveness test of the model was conducted using a paired t-test, which was analyzed using SPSS software version 26. The results of the effectiveness test were declared effective if the significance value was less than 0.05, and this could explain the difference in students' critical thinking skills before and after participating in economics learning with the Content Differentiated Blended Learning model with the Media Learning Management System. The test results can be seen more clearly in Table 13 below.

Table 13. Paired Sample Statistics Test Results PreTest and Post-Test Data

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PreTest1	31.88	143	8.492	.710
	Post Test	85.21	143	6.578	.550

Source: processed data, 2024

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Table 13 above shows that the mean post-test respondents are higher than the mean pre-test respondents. It can be interpreted that the average critical thinking skills of students in economics subjects after implementing the Content Differentiated Blended Learning model with the Media Learning Management System have increased. This is supported by data from the analysis of paired sample tests, which show a significant difference in the critical thinking skills of respondents based on the pre-test and post-test data. The results of this analysis can be seen more clearly in the following table 4.34.

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PreTest1 - Post Test	-53.329	12.741	1.065	-55.435	-51.222	-50.051	142	.000

Tabel 13. Hasil Uji Paired Sampel Test

Source: processed data, 2024

Table 13 shows the analysis of the results of the difference test with the t-test, which shows the significance value of the sign (2-tailed). = 0.000 <α = 0.05. This can be interpreted as a significant average difference in students' critical thinking skills before and after implementing the Content Differentiated Blended Learning model with the Media Learning Management System. Therefore, based on the results of the t-test analysis, it can be concluded that the Content Differentiated Blended Learning model with the Media Learning Management System positively impacts students' critical thinking skills in the economics subject of grade XI SMA.

Results of FGD reflection Cycle 1

Table 14. Results of FGD Reflection Cycle 1

Component	FGD Reflection Notes
Learning Stages	
Early Learning	The initial learning process was quite interesting for the students, and an innovative PowerPoint was developed by researchers and collaborating teachers to convey the material on price indexes and inflation.
Implementation of Core Learning	During core learning using the Rumah Pintar Ekonomi LMS media, there was a little confusion between teachers and students, starting from creating an account for students. The teacher had to validate it up to the non-cognitive diagnostic analysis stage.
	Students have a high level of interest when directed by the LMS Rumah Pintar Ekonomi in learning using learning modules according to their learning style.
Evaluation Stage	Students still do not have a high level of self-confidence when asked to present their work results in front of the class. Students still wait to be pointed at by the teacher and are forced a little before they agree to come forward.
Evaluation Results	All learning style groups have completed the bill on the learning module with the price index material.

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Improving Critical Thinking Skills	
1. Provide a Simple Explanation	Visually, only a few students can provide straightforward explanations, and many are still afraid to express their opinions.
2. Building Basic Skills	Visually, few students are willing to utilize other learning resources to build basic answering skills. Most students are still reluctant to seek more information from different sources.
3. Making Conclusions	Visually, many students still experience difficulties when making conclusions, both deductively and inductively. Students still need to be guided by teachers.
4. Make Further Explanation	Visually, many students still experience difficulties providing further explanations related to the answers they are trying to create to solve the price index problem.
5. Making Estimates and Integration	Visually, most students still experience difficulties integrating one topic with another and still experience problems when asked to try to align the answers they have developed regarding the price index.

Source: processed data, 2024

Results of FGD reflection Cycle 2

Table 15. Results of FGD Reflection Cycle 2

Component	FGD Reflection Notes
Learning Stages	
Early Learning	Learning begins with presenting videos and images related to inflation occurring in several countries and interactive PowerPoint presentations from the teacher, making students enthusiastic about participating in the teaching.
Implementation of Core Learning	In the second learning cycle, teachers and students have begun to understand the stages of the learning model. Students can immediately adjust their learning by opening the LMS through their respective accounts.
	Students have high enthusiasm for discussing with group members, using the same learning style, to solve problems in the inflation learning module.
Evaluation Stage	Students are ready to complete the evaluation stage through a post-test provided on the LMS Rumah Pintar Ekonomi.
Evaluation Results	All students were able to complete group assignments and post-test stages well.
Improving Critical Thinking Skills	
1. Provide a Simple Explanation	Visually, most students can demonstrate the ability to provide simple explanations when problems or questions are presented to students.
2. Building Basic Skills	Visually, most students can already build basic skills by studying the material taught and then adapting it to what happens in everyday life, and then students evaluate it.
3. Making Conclusions	Visually, students already have principles, beliefs, and opinions to conclude discussions related to inflation material.
4. Make Further Explanation	Visually, students can provide assumptions about the problems related to inflation material.

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5. Making Estimates and Integration	Visually, students can integrate inflation learning with the real situation they are facing to find alternative solutions to overcome this problem.

Source: processed data, 2024

Result and Discussion

The development of the Content Differentiated Blended Learning model with the Media Learning Management System has been carried out along with the problems in students' critical thinking skills so that innovation is needed in the application of learning models and media as an alternative to solving these problems (Asih et al., 2023). The Content Differentiated Blended Learning model with the Media Learning Management System was developed so that it can be used for synchronous and asynchronous economic learning (hybrid learning) (Syarifudin et al., 2024). Economic learning through hybrid learning can improve students' problem-solving and critical-thinking abilities (Cheristiyanto, 2021; Elmabaredy et al., 2020).

The Content Differentiated Blended Learning model with Media Learning Management System (CDBL-LMS) with stages of non-cognitive diagnostic analysis, differentiated instruction, content (material deepening), blended learning, conclusion, and evaluation, which are realized in the form of an LMS-based website named Rumah Pintar Ekonomi, Economic Learning Module with four VARK learning styles, LMS usage guidebook for teachers and students. The learning module with the VARK learning style already has an ISBN. For the learning module and LMS media, Rumah Pintar Ekonomi has intellectual property rights registered with the Intellectual Property Rights of the Ministry of Law and Human Rights. Each cycle in the Content Differentiated Blended Learning model with Media Learning Management System has been implemented with several stages that are improved and updated according to the conditions and circumstances of students in each educational unit.

The analysis results related to the ability of critical thinking skills in each indicator were compared. The highest increase appeared in the second indicator, namely building basic skills, which was 44.02% at the stage before the model was applied and entered the sufficient category and 94.40% after the model was applied and entered the excellent category. This is in line with research conducted by (Afriana et al., 2021; Umami & Indiana, 2023), which stated that there was a significant increase in the critical thinking skills variable of students, especially in the indicator of building essential skills if learning was carried out with innovative and appropriate learning models and media. This is because to support these abilities, students in learning are asked to make many observations of things that are often encountered or experienced in everyday life, consider the results of these observations, and use them as answers to problems that have a strong basis.

The Content Differentiated Blended Learning model with the Media Learning Management System is implemented according to the stages that have been developed. Based on the results of observation and reflection data, data was obtained that the increase in students' critical thinking skills occurred from the first implementation cycle to the second. The results of the analysis were found in observations during learning using the Content Differentiated Blended Learning model with the Media Learning Management System.

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