

# Enhancing Educational Courses through A Collaborative Learning Management System: A Study on Effectiveness

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## ABSTRACT

This study evaluates the effectiveness of a collaborative learning model integrated with a learning management system in diverse educational contexts. The issue of suboptimal student learning outcomes is often attributed to deficiencies in the development of instructional models and media. The critical role of instructional media in achieving successful learning outcomes necessitates research to bridge the gaps between actual knowledge, theoretical expectations, and practical applications. This study aims to enhance educational models and materials by employing the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) framework for Research and Development. It involved 35 education students and adopted methods such as expert validation, lecturer feedback, and pre-and post-test evaluations for data collection. The analysis covered design, development, testing, and evaluation stages, confirming the developed model's efficacy and functionality. Evaluations by experts in technology and learning models, alongside peer assessments, supported the model's high effectiveness. Preliminary experiments achieved an average score of 88.

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## 1. IDENTIFICATION

Technology is utilized as a tool in the learning process at higher education levels (Vergara et al., 2022; Gamage et al., 2022; Tao and Gao, 2022). Media technology, in particular, is the most effective tool for transferring information in higher education courses (Antonetti et al., 2022; Horagova et al., 2022; Haleem, Javed, Qadri, et al., 2022; Brugman et al., 2022). Despite this, there is a problem of low student learning outcomes in educational management courses. These poor outcomes stem from various obstacles during the learning process, such as instability of the media used, interference with media tools, and difficulties in using media that do not support the learning model (Suzanti et al., 2021; Chen et al., 2009; Lapitan et al., 2021).

Currently, educational platforms like Zoom, Teams, and Google Meet are widely accepted by students (Stekola Wolniak, 2022; Estrella, 2022; Li et al., 2022). However, unlike primary and secondary schools, universities require extensive administration and media tools for storing all learning information, including lesson plans, materials, rubrics, videos, and student assignments. This necessitates the use of a

suitable model (Tamrin et al., 2017; Chawinga, 2017). Universities now employ a learning media management system and a collaborative learning model to improve learning outcomes and the effectiveness of the learning process (Al-Marashda, 2016; Laughlin and Smith, 2017). In conclusion, while technology and media tools significantly enhance the learning process in higher education, ensuring their stability and compatibility with collaborative learning models is crucial for overcoming obstacles and improving student learning outcomes.

However, in reality, in 2021 the learning process at higher education level will experience a decline, according to the survey there was a decrease of 36% and 67% had difficulty using media. Meanwhile, students consider that using a learning management system requires a relatively long process and the courses taught must be in accordance with the material and models provided by the learning management system; Chan et al., 2021; . Another fact is that in 2022, the survey found that the use of learning management systems will still far exceed expectations. 62% of students feel that they still face difficulties in the learning process using learning management system media. Students said that apart from difficulties in communicating, students also experienced difficulties in saving assignments and accessing material provided by lecturers. At the same time, lecturers themselves face obstacles in organizing material and entering it into the learning management system. The opinions of lecturers and students agree that there are problems in using the learning management system.

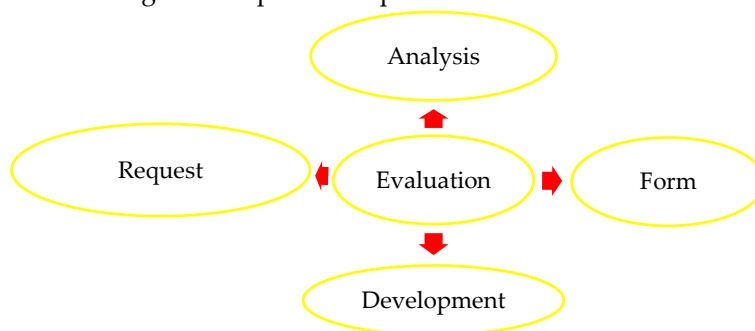
In this research needs analysis, by asking the lecturer about the problems that are often encountered, the lecturer answered that the usefulness of a learning plan for a learning management system starts from the unit, evaluation form, form used, division of tasks, task groups, and collection of student assignments. The impact is that students are not optimal in the learning process. A needs analysis was also carried out by looking at the learning outcomes of students taking the Education Management course, and of the 30 students there were 18 who faced problems and the expected results did not reach the target. When students were asked about the obstacles and difficulties they faced, these obstacles and difficulties were in accessing learning management system study materials and modifying the learning models used by lecturers. The learning model used so far in education management courses is cooperative learning. However, the fact is that during the online learning process, group discussions and interest in learning decreases. The collaborative learning model is a model that brings together all the understanding involved in the discussion (Najmi and Sadeghnejad, 2023 ; Matos et al., 2022 ; Owoguri and Okoro, 2022) . Development theory says that to achieve success in the learning process of a subject it is necessary to develop an approach to the media used (Ostadi et al., 2022) . To overcome this problem, it is very urgent to carry out a development study, because there is a difference between the expectations of students who seek understanding by using media and models, and the theory which says that media and models are tools used to convey lecture material and models. . Facts about Learning Results in Basic Education Management Courses.

According to Spatioti, Kazanidis, and Pang (2022), producing effective products and models for online learning requires following specific development steps. In this research, the ADDIE model—comprising analysis, design, development, implementation, and evaluation—was employed. This developmental theory addresses student issues and offers solutions to enhance learning outcomes through supportive products (Stolz et al., 2022). Integrating this model into the media and materials presented fosters students' understanding through continuous discussion (Phungsuk et al., 2017; Haleem, Javed, and Singh, 2022). The aims of this research are to: 1) explore the e-learning method and collaborative model, 2) evaluate the effectiveness and practicality of the product, and 3) assess the improvement in understanding and learning outcomes in educational management courses.

## 2. METHODS

The research method used is research and development (R&D) using the ADDIE model, namely analysis, design, development, implementation, and evaluation; S. Yu et al., 2022 ; Kumar et al., 2022) . The subject of this research is education and the research objective is 35 educational administration students At Widya Dharma University Klatin. Data collection techniques are used by distributing

products to be evaluated and validated by learning experts, technology experts, learning model experts, lecturers, colleagues, and students. Data was also obtained by conducting pre-tests and post-tests on students. This test was carried out on 35 students, and students were also asked to fill out a product review tool and e-learning form which had been tested on students (Flores et al., 2016 ; Campillo Ferrer et al., 2020 ; Bryan and Karchmer, 2013 ; Ritunga et al., 2022) . The first stage analyzes the needs of teachers and students to support the learning process of educational management courses. Everything is recorded and becomes the basis for designing materials, media and models that are the basis of the problem. The second stage of product design. At the design stage, research designs collaborative models and materials and integrates them into the media used in e-learning. The third stage of development. The research was validated by subject experts, colleagues, and students. The experts selected are technology experts, learning experts and learning model experts. Meanwhile, the lecturers selected are lecturers in the Education Management course to carry out verification. The fourth stage is implementation. This research conducted a two-stage experiment, namely a small-scale experiment and a large-scale experiment. The small group experiment consisted of 18 students and the large group experiment consisted of 35 students. Before carrying out the experiment, the researcher also carried out a pre-test and after carrying out the post-test. The final stage is evaluation. At this final stage, an evaluation of the effectiveness of learning is carried out. In this evaluation, the evaluation is also carried out by looking at the post-test average and becomes the basis for seeing that the product is practical and effective.



**Figure 1.** Flow of Research (SJ Yu et al., 2021)

Analysis Techniques Analysis is carried out on e-learning products and models by analyzing evaluations given by experts, colleagues and students. Each rating item is totaled and a final average is seen. The evaluation presented is made in the form of tables and graphs and is the basis for interpreting the results. Next, the research evaluates e-learning and collaborative learning models based on the results of technology validation, learning model experts, management lecturers, and students in small group experiments. Data were analyzed using Likert scale calculations with points 1 to 5. The success rate was used in the calculations (de Vries et al., 2022 ; Tenorio et al., 2016 ; Cashiro et al., 2023) .

$$P = \frac{S}{N} \times 100\% \tag{1}$$

P = success rate (%)

S = total value obtained

N = maximum number of values

**Table 1.** Research instrument evaluation scale

Alternative answer	Pressure
Very good	5
Good	4
Adequate	3
Not good	2
Not so good	1

The data obtained is then measured by interpreting the results as follows:

**Table 2.** Interpretation of Likert scale scores

Percent	Explanation
0% - 20%	Not so good
21% - 40%	not good
41% - 60%	adequate
61% - 80%	Good
81% - 100%	very good

The results of data analysis from validation and testing of questionnaire instruments will be presented in. Master individual learning. To determine individual learning solutions it can be calculated using the following equation:

$$KI = \frac{X}{X_{Max}} \times 100\% \quad (2)$$

Information:

KI = Individual Learning Mastery

X = total score obtained by students

Xmax = maximum total score

The minimum standard of completeness used at the examination site is a reference for declaring individual learning complete. Individual learning is complete if the percentage of student participants' correct answers is  $\geq 70\%$ . Mastering classical learning. To determine classical learning completeness, it can be calculated using the following equation:

$$KB = \frac{NS}{N} \times 100\% \quad (3)$$

Information:

KB = Classical Learning Completed

NS = the number of students who take part using a score of  $\geq 75$

N = number of students participating

**Table 3.** Classification of individual and classical learning solutions

PowerPoint	Explanation
0% - 39%	Very low
40% - 59%	A little
60% - 74%	at this time
65% - 84%	long
85% - 100%	very high

### 3. FINDINGS AND DISCUSSION

The level of analysis of student needs and needs analysis revealed several insights. Students reported obstacles and difficulties in educational management courses, emphasizing that the course requires not only theoretical knowledge but also practical, hands-on experience, which is diminished in an online setting. They expressed a desire for the development of appropriately formatted e-learning resources to support Learning Management lectures both before and during the course. Students indicated that online learning diminishes their understanding and learning outcomes due to inappropriate media and models. Similarly, lecturers reported facing challenges in preparing and implementing courses through e-learning, noting that the current model was unsuitable. They expressed the need for a more effective collaborative model to be developed and integrated into the e-learning process. The impact of these challenges is reflected in the students' pre-test results, highlighting the need for improvement in the online learning approach.

**Table 4.** Student pre-test results

Class A	Pre-test scores	Class B	Pre-test scores
1	55	1	48
2	25	2	15
3	47	3	32
4	60	4	35
5	70	5	35
6	65	6	25
7	23	7	10
8	17	8	44
9	25	9	15
10	45	10	30
11	65	11	45
12	45	12	23
13	40	13	56
14	35	14	62
15	47	15	42
16	45	16	43
17	60	17	62
18	27	18	32
Amount	44.22	Amount	36.33

Learning materials are prepared and designed using a collaborative learning model and included in the learning management system used in the learning process so far. This study includes lesson plans, materials, collaboration assignments, project assignments, rubrics, and evaluation of each component. In designing the model, this research considered the expectations of students and lecturers during needs analysis. The design process lasted for two months until the product was ready to be validated by domain experts, including technology experts, learning model experts, colleagues, and students, after the implementation process was complete.

Research prepares products for evaluation by technology experts. The validation process was carried out for two months until technology experts deemed the product suitable for testing by other experts. Based on Table 5, it can be seen that technology experts gave an average score of 92.13, and this can mean that the media development carried out in this research is included in the very good category.

**Table 5.** Technology Expert Evaluation Results

No	Pointer	Power Point	Category
1	Learning Components	93.12	Very Good
2	Contraction	92.03	Very Good
3	The Model Fits	91.30	Very Good
4	How To Apply	92.10	Very Good
	Average	92.13	Very Good

Validation by learning model experts. Learning Expert has been verified 5 times in 2 months. By looking at Figure 2, learning model experts gave a very good response to the product being developed. Learning model experts assessed the suitability of subject indicators at 91.12, written language design at 92.50, suitability of the model for e-learning at 91.33, and model construction at 90.80. Learning model experts can be interpreted as providing a good assessment of all assessment components.

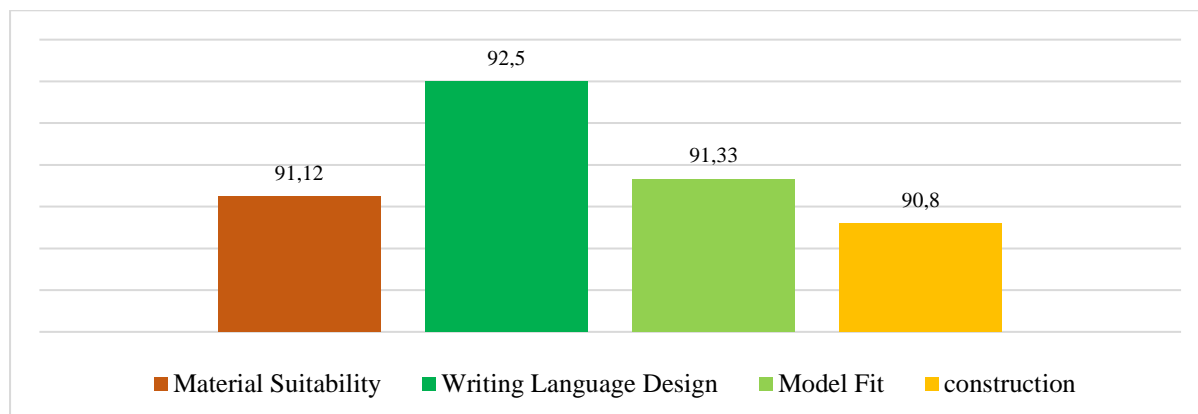


Figure 2. Expert validation evaluation learning model

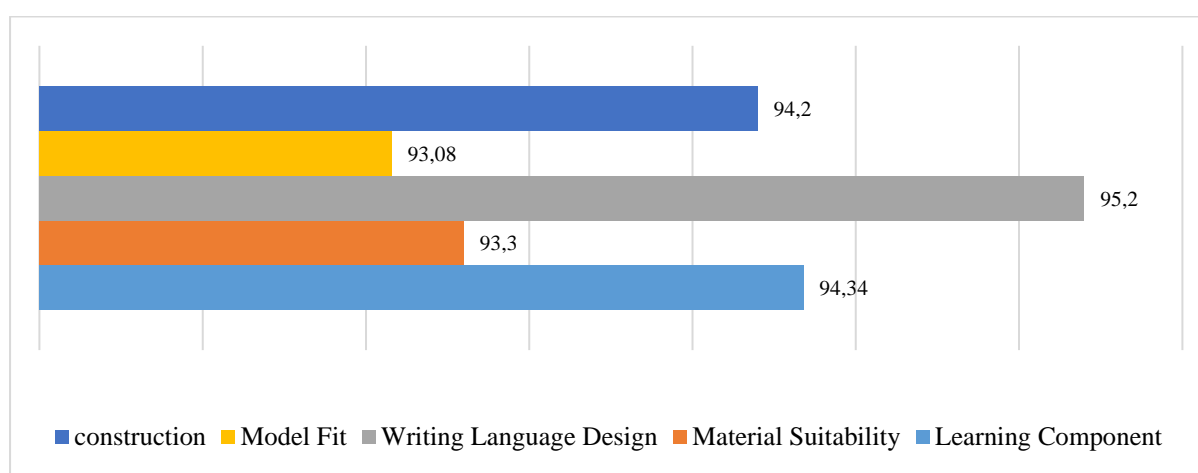


Figure 3. Peer validation assessment

Panel validation in Figure 3 shows that peers also provide very good assessments of all product components developed in this research. Colleagues gave written language component scores of 94.20, content suitability 93.30, written language design 95.20, form suitability 93.08, and structure 94.20. Of all the components of the assessment given, colleagues interpreted it well request

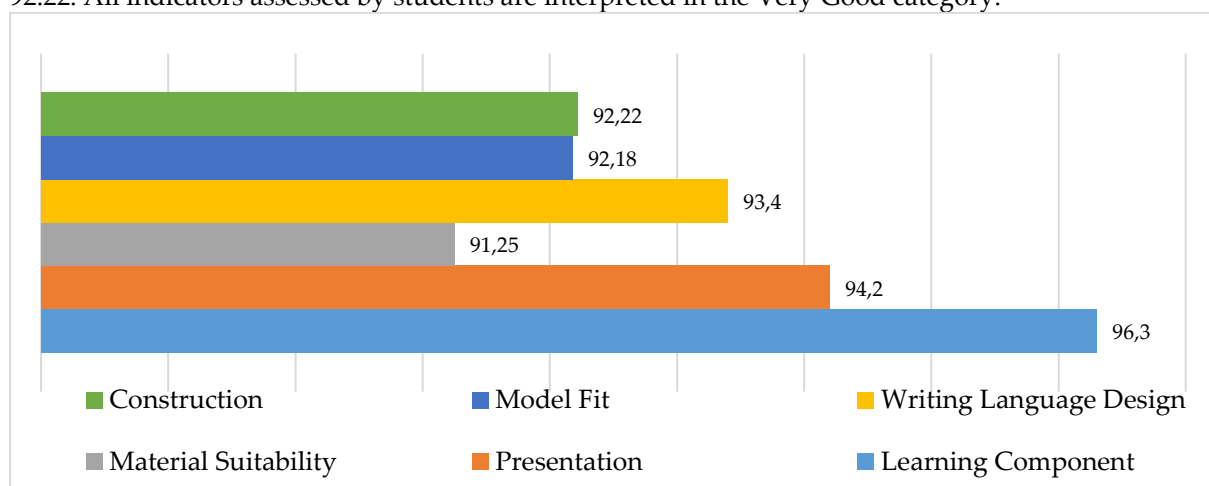
### 3.1 Small group experiments

At this implementation stage, the research has conducted experiments by providing products to students in the learning process. Materials, forms, assignments, projects, rubrics and assessments are provided in LMS media. Before carrying out the learning process, research provides instructions for students to view and access the products being developed. The research continued for one month and I did not find any obstacles in the continuous learning process. At the end of the learning process, researchers conducted a post-test on students to find out what improvements could be obtained with the help of the product that had been developed. Table 6 shows the learning outcomes obtained by students when carried out in small groups obtained very good results. This is because the product developed is e-learning, and the model that has been validated by experts has shown ideal results with the results obtained by students when tested on ten people. The value 88.40 can be interpreted well. The results obtained by small group students during the experiment were as follows:

**Table 6.** Student test results in small groups

student	Pre-test scores
1	89
2	95
3	89
4	90
5	89
6	89
7	84
8	86
9	84
10	89
Average	88.40

Figure 3 shows students' evaluations of the designed, verified and tested products. Student assessments of learning component indicators were 96.30, delivery methods were 94.20, suitability of material was 91.25, written language design was 93.40, suitability of form was 92.18, and construction. 92.22. All indicators assessed by students are interpreted in the Very Good category.



**Figure 4.** Student evaluation

Large group experiments. In the large group testing phase, students learn with the help of a product that is designed, validated, and tested on a small scale with students. Before carrying out the learning process, a pre-test is first given to all students. Then continue the implementation with the help of existing products. Throughout the learning process for this educational management course, it lasted for 4 months and during this time the materials, models and other equipment were recorded and improved on online media. Table 7 compares before and after the product-assisted learning process with a mean before of 40.27 and a mean after 90.83.

**Table 7.** Student post-test results

No	Pre-test scores	Post-test scores
1	55	98
2	25	88
3	47	95
4	60	95
5	70	100
6	65	89
7	23	95
8	17	85
9	25	95
10	45	96

11	65	97
12	45	90
13	40	93
14	35	93
15	47	92
16	45	88
17	60	95
18	27	89
19	48	98
20	15	80
21	32	85
22	35	88
23	35	85
24	25	85
25	10	95
26	44	88
27	15	86
28	30	92
29	45	88
30	23	85
31	56	92
32	62	89
33	42	84
34	43	89
35	62	93
36	32	95
middle	40.27	90.83

### 3.2 Evaluation

Figure 5 shows the differences in learning outcomes between the category of students who use the product and the category of students who do not use the product. The average learning outcome for students who use the product is 90.83, and the average for students who do not use the product is 72.22. Students also evaluated the devices provided and the results are as shown in Figure 6. The evaluations given by students regarding the product-assisted learning process were very good. This can be seen from all evaluation index components given to students with a score of 90, for the e-learning component 93.80, feasibility, level 94.13, presentation 97.68, and written language material 96.78. This has positive value in answering basic problems and being a solution to previous problems in the teacher management cycle.

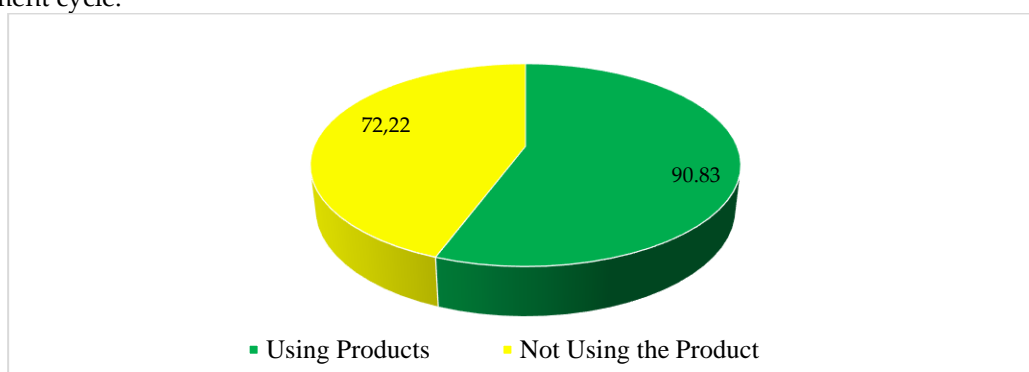
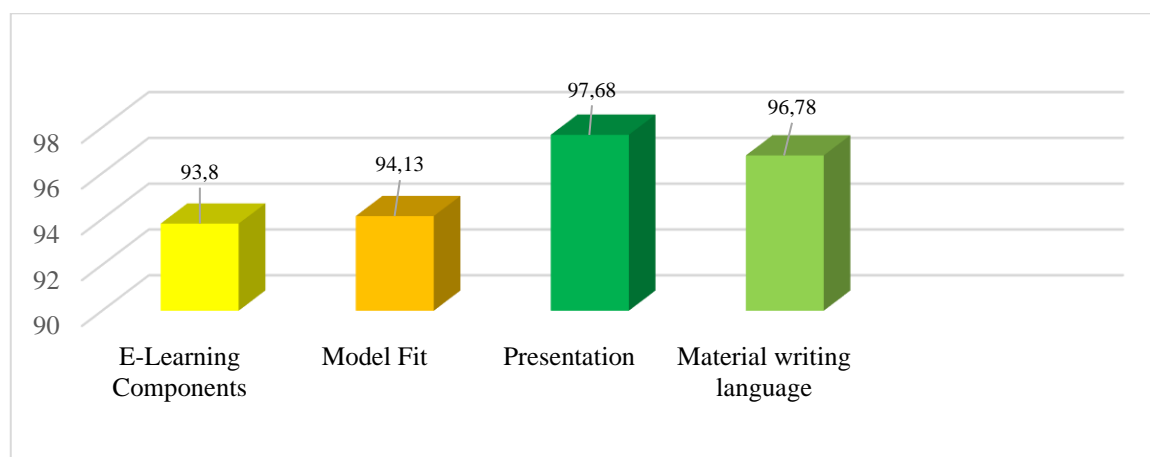


Figure 5. Comparison of learning outcomes using the product and not using the product





**Figure 6.** Student evaluation of the product

## Discussion

### Building valid e-learning approaches and collaborative models

The form of the online method developed in this research is a learning management system. Materials, learning plans, methods, models, learning strategies, assignments, projects, rubrics and assessments that have been previously designed are entered into the learning management system. This product is equipped with a collaborative model that divides projects and assignments into several groups and is given to students to discuss each subject in the teacher management course. This product has been rated by experts as excellent. The product evaluation process begins with technology experts by providing an average value for all evaluation indicator components, namely 92.13. Considering the extraordinary value of technology experts, this research was continued with validation with learning model experts. Learning model experts perform detailed validation and are interested in collaborative models used in learning management systems. At the end of validation, learning model experts gave an average score of 91.43 for all components. At the final verification stage, the lecturer or fellow teacher gave the BK a very good assessment with a score of 93.25. Online methods have been proven and are in line with the theories of Crompton, Biernacki, and Green (2020) and Patricia Aguilera-Hermida (2020) that the online media developed can improve understanding and learning outcomes.

### Product effectiveness and practicality

The effectiveness and practicality of the product can be seen from the learning results obtained by students during the post-test. The effectiveness of the learning process is measured from the post-test results in Table 7 with an average of 90.83. Meanwhile, the practicality of student responses and assessment of the learning process is measured from the results of the tool in Figure 6. Student assessment of e-learning items is 93.80, model fit is 94.13, model and media presentation is 97.68 and language consumption is 96.78. These results show that the development of learning models with the help of LMS is said to be effective and practical in the learning process in class by paying attention to the models provided in the material and implemented through LMS media. These results are in accordance with the theory that the model developed for the subject can be applied through LMS media (Nguyen, 2021 ; Wu et al., 2020) .

### Increase understanding and improve learning outcomes

The large-scale experiment revealed distinct learning outcomes across different classes. Specifically, the class that used collaborative model media showed significantly better results compared to the class that did not use such media and modules. As illustrated in Figure 5, the post-test results for classes without collaborative models and media averaged 72.22, whereas the average learning score for students in the educational psychology guidance course was 90.83. This substantial difference highlights the effectiveness of combining media and cooperative learning models in the educational

media management system. These findings confirm that the learning process in educational management courses is significantly enhanced when media and material are appropriately integrated, aligning with the theoretical and empirical evidence from previous research (Li and Bora, 2020; Chowdhury and Arora, 2021; Nasser et al., 2021; Tokyo, 2015). Therefore, the use of well-designed media and collaborative learning models is crucial for optimizing student learning outcomes.

#### 4. CONCLUSION

The resulting product underwent processing, verification, and small-scale testing, achieving an average score of 88.40. Technology experts evaluated the product with a mean score of 92.13, while modeling experts and colleagues provided mean scores of 91.43 and 94.02, respectively. Additionally, the product was tested in a broader context, resulting in an average post-test score of 90.83. These evaluation results indicate that the product is highly effective for use in the learning process for educational management courses, demonstrating the value of both the e-learning model and the collaborative model utilized.

However, this study has limitations, including the lack of experimentation and testing in diverse contexts and settings. Future research should address these limitations by developing and testing e-learning products and models more extensively across different educational environments. Expanding the scope of testing will help to confirm the product's efficacy and adaptability, ensuring its broader applicability and potential for improving learning outcomes in various educational contexts.

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**Conflict of interest:** There is no conflict of interest in writing this article.

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