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ELECTRONIC PROBLEM-BASED LEARNING WITH COLLASSION LEARNING

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Abstract*: The goal of this study is to evaluate the effectiveness of the e-PBL with Collassion Learning model in the Information System Analysis and Design course. Collassion Learning is a form of blended learning that places a premium on collaborative learning and student discussion. Students can use the Collassion Learning App to collaborate and discuss in small groups both inside and outside the classroom. Without regard for space or time constraints, lecturers can monitor and provide feedback directly. This study employs the R&D method. The t-test yields a value of -4.024 with a significance level of 0.001. 3.55181 is the value of the t-table with N=20. Because t-count is less than t-table, it is plausible to conclude that significant variations in learning outcomes exist before to and following the adoption of the e-PBL-based Information System Analysis and Design learning model with Collassion Learning. The e-PBL learning model combined with Collassion Learning is suggested as a way to improve the effectiveness of the Information System Analysis and Design course.*

Keywords*: e-PBL, Collassion Learning, Blended Learning, Collaborative, Discussion.*

Introduction

In addition to technology in the field of education that has been widely used, various learning models have also been developed so that the teaching and learning process becomes interesting and effective in achieving the expected goals. Higher Order Thinking Skills (HOTS) in analyzing and designing information systems are needed by students in the Information Systems study program to improve existing systems and produce system designs that suit user needs. However, the facts show that the ability of students to analyze and design information systems is still low. This will certainly affect the achievement of learning outcomes for the Information System Analysis and Design course and the quality of the information system design produced by students. Therefore, efforts are needed to improve students' HOTS, which is done through Problem-Based Learning (PBL). The competencies included in the HOTS are critical thinking, creativity and innovation, communication skills, collaboration, and confidence. The PBL model can encourage students to think objectively, critically, and analytically (Bashith & Amin, 2017).

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PBL is a collaborative, constructivist, and contextual learning model that utilizes real or simulated problems directly related to student performance as to future professionals (Alves et al., 2019). Collaborative skill is the ability to work in a team by combining several individuals to achieve a common goal (Mishra & Kereluik, 2011). In collaboration, there is an interaction between group members in sharing experiences and information (Vangrieken et al., 2015). This is done during face-to-face learning in the classroom and when doing assignments outside the school. Cognitive talents can shape students' reasoning as they conduct investigations to solve contextual difficulties (Quieng et al., 2015) so that student learning outcomes improve (Marzuki et al., 2015). The PBL paradigm was chosen for this study due of its correctness as a 21st-century learning model. The 21st-century learning paradigm places a premium on students' capacity to gather information from a variety of sources, formulate problems, think analytically, communicate and work collaboratively to solve problems, and utilise technology and information as learning media (Ozkana et al., 2014). Cooperative learning skills are an important aspect of 21st-century learning since they demand teamwork to be successful in the classroom. Teamwork is important in team integration because it allows each team member to exchange ideas and information in order to create a learning experience for everyone (Vangrieken et al., 2015). Another advantage of collaborative abilities is that they enhance students' social competence as well as their learning efficiency (Oâ€™Leary et al., 2012) in order to achieve higher levels of performance. The outcomes of cognitive learning can be linked to the ability to collaborate. Social interaction happens between students in their groups throughout the cooperation process, which drives the development of conceptual knowledge since students will want to make them comprehend and understand other group members, resulting in knowledge sharing (Le et al., 2017). Several studies have discovered that students' active participation in group collaboration can assist them in completing assignments more effectively than they would if they worked alone (Elgort et al., 2008). Other studies have found that students who work collaboratively are more effective communicators of their ideas (Kramarski & Zemira R. Mevarech., 2003) and improve learning outcomes (Kuhn & David Dean Jr., 2004). On the other hand, the lack of skills in collaborating will hinder student performance in groups, which affects learning outcomes (Popova et al., 2012).

Combining traditional learning paradigms with information technology in the form of e-learning is a reasonable attempt to meet the educational demands of the twenty-first century. By adding technology into the course design, e-learning may be used to improve the quality of interactive learning between lecturers and students (BakiÄ‡-To et al., 2015). While electronic learning has a number of theoretical advantages, when completely implemented, it has the disadvantage of limiting interaction between students and lecturers, as well as between students themselves (Khan et al., 2017). This has the potential to impede the establishment of values in learning, as instructors' roles and presence are critical in the classroom's implementation of knowledge. While e-learning has some drawbacks, blended learning, which mixes face-to-face and online training, can assist overcome these drawbacks (Webb, 2009). This study uses blended learning because students can obtain and study 30%-79% of learning materials online (Dikti, 2019). Blended learning gives students with a great deal of freedom during the learning process. Blended learning provides students with a great deal of flexibility in the course of their ongoing education (J. Poon., 2012) supports meaningful active learning (Garrison & Heather Kanuka., 2004).

Collassion Learning is the paradigm established in this study, where Collassion stands for Collaborative and Discussion, both of which are characteristics of problem-based learning. A Collassion Learning implementation consists of four parts: learning stages referred to as Syntax

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Collassion Learning, Collassion Learning Reaction Principles, Collassion Learning Social System, and a support system, which is represented by an application called the Collassion Learning-App.

Method

The Research and Development (R&D) approach is being used in this investigation. This strategy, rather than testing theory, can be used to generate a useful product for schools (Wibawa, 2014). Figure 1 depicts a research chart that describes the steps of the research process.

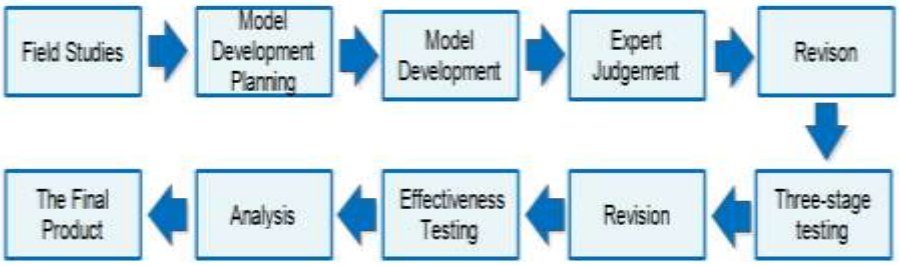

Figure 1: The Research Chart

Results and Discussion

The stages carried out in this research are as follows:

A. Field Studies

Preliminary research was conducted to obtain a specific description of the learning model to be developed. This stage is carried out through a questionnaire to determine the needs of students and lecturers. Besides that, a literature study is also carried out to study various related theories and relevant previous research.

B. Model Development Planning

Model development planning is carried out to estimate the resources needed by first determining the product to be developed. The products designed as a learning model support system consist of Collassion Learning-App learning applications, learning modules, teaching materials, teaching videos, and practice questions based on HOTS.

C. Model Development

In Syntax Collassion Learning, each phase will have an impact on the reaction of the lecturers, which are referred to as the Principles of Reaction Collassion Learning, as well as social systems, which are interactions among students both inside groups and between groups in a class setting. The support system in use consists of the Collassion Learning module, which is loaded with HOTS-based tasks, as well as information and communication technology assistance, which is referred to as the Collassion Learning-App, which promotes collaboration and discussion among participants. Collatsson Learning-App is a hybrid approach of problem-based learning that combines traditional (face-to-face) and online problem-based learning, or blended learning, to produce a problem-based learning environment. Rotation Model and Flex Model, both of which were developed by Staker and Horn, were adapted for use in Problem-Based Collision Blended (Staker & Horn, 2012) and tailored to Syntax Collassion Learning techniques. Problem-Based Collassion Blended is a blended learning approach in which

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students learn activities in accordance with the Collassion Learning syntax, which consists of six phases and is organised into sessions. Participants meet in person for phases 1 and 5, while steps 2, 3, 4, and 6 are completed online, with an emphasis on collaboration and group discussion. Lecturers frequently make use of information and communication technology to assist in monitoring and providing direct feedback at each point. Collassion Learning App. Collassion Learning-App is written in PHP programming language, also known as Hypertext Preprocessor and uses the CodeIgniter framework. This application promotes the Collassion Learning paradigm of collaborative learning, which combines two of the six collaborative learning methodologies, Problem Solving and Discussion (Barkley et al., 2014). Syntax Collassion Learning as shown in Figure 2 bellow:

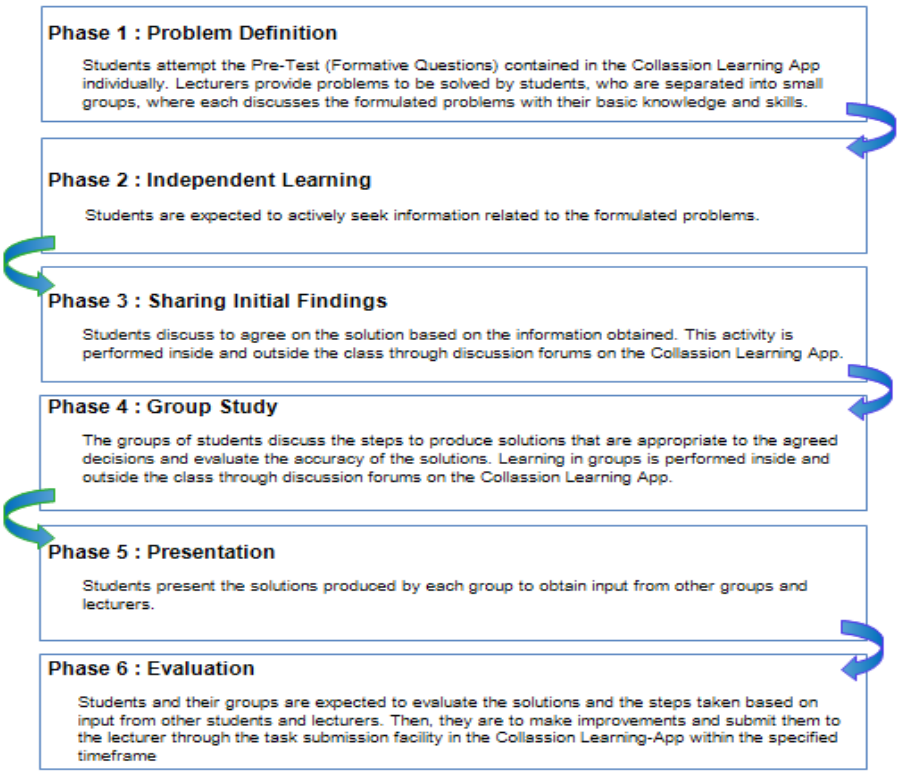

Figure 2: Syntax Collassion Learning

Some of the Collassion Learning-App screen displays can be seen in the following images:
Figure 3 is a screen display that displays the lecturer's teaching schedule, which includes the day, hour, class, and the name of the course being taught. On the right, there is a calendar that displays the day, date, and time when accessed. If the name of the course is clicked, the details of the course will appear, which include semester learning plans, teaching materials, teaching videos, pre test and post test questions, and assignments for each meeting from meeting 1 to meeting 15. End-of-semester exam questions will appear on the date and time the exam takes place.

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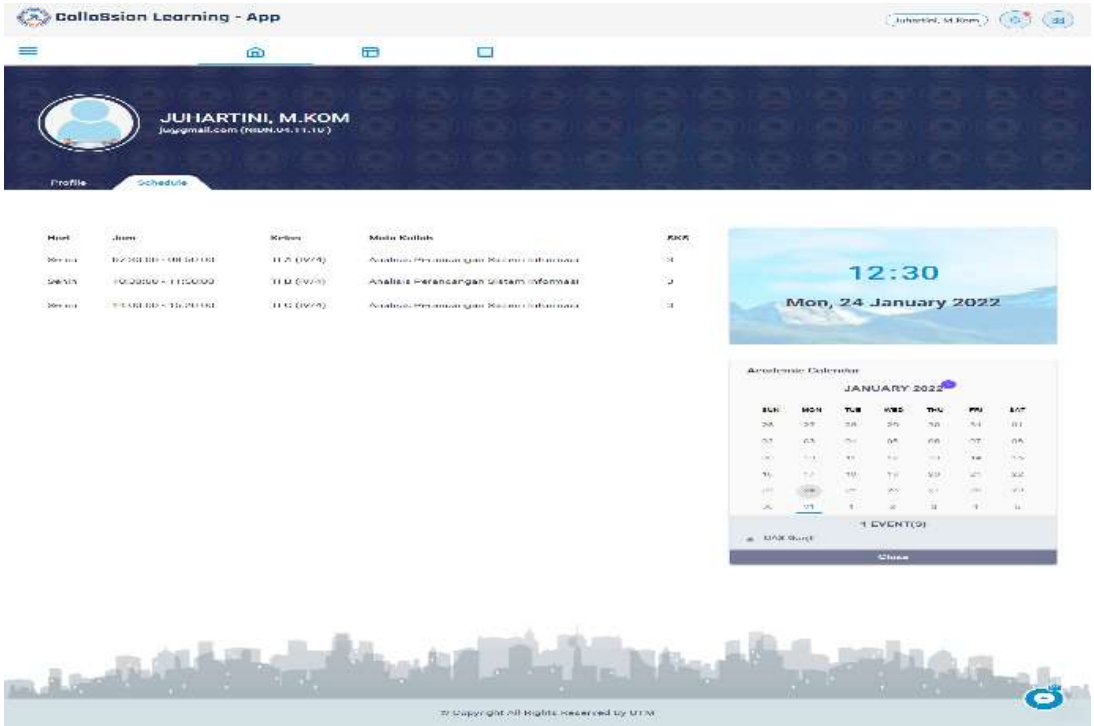

Figure 3: Screen Display of Lecturer Teaching Schedule

Figure 4 is a screen display showing the courses taken by students in that semester. On the right, there is a calendar that displays the day, date, and time when accessed. If the name of the course is clicked, the details of the course will appear, which include semester learning plans, teaching materials, teaching videos, pre-test and post-test questions, and assignments for each meeting from meeting 1 to meeting 15. End-of-semester exam questions will appear on the date and time. The time the exam takes place.

Figure 4: Screen Display of Student Home

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Figure 5 shows the live chat feature between students and lecturers. Students can ask something related to this course with the lecturer personally.

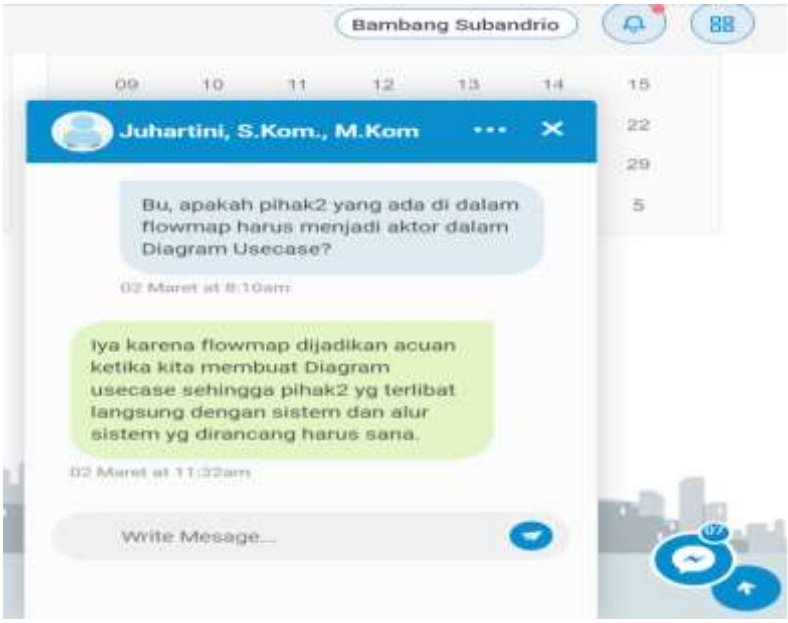

Figure 5: Screen Display of Live Chat

Figure 6 is a screenshot of the group discussion screen. Each group uses this feature to discuss their group assignments. Lecturers play the role of monitoring the course of group discussions and providing direct feedback on the discussion process carried out in each group of students. Meetings are conducted based on text and can attach images and videos.

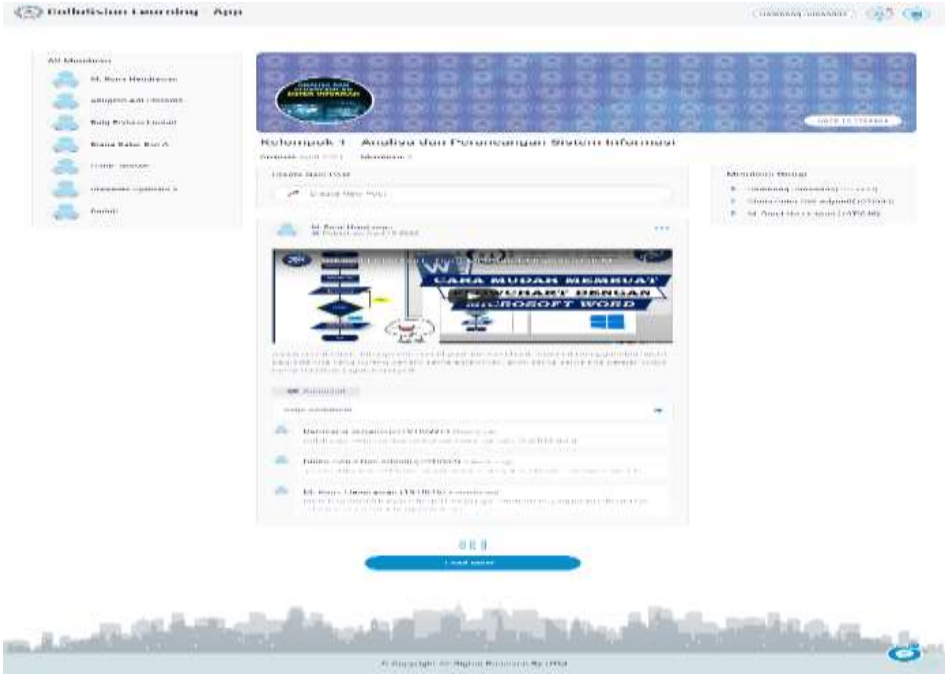

Figure 6: Screen Display of Group Discussion

Figure 7 is a screenshot of a discussion with classmates, where all students taking this course in the same class can discuss with each other. The lecturer can monitor the system of group

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discussions and provide direct feedback on the discussion process carried out in the course. Discussions are conducted based on text and can attach images and videos.

Figure 7: Screen Display of Discussion with Classmates

Expert Judgement

Expert judgment is needed to determine the feasibility of the product being developed. There are four experts involved in this research, namely instructional design experts, materials experts, technology and learning media experts, and language and communication experts.

Revision

The experts' input and suggestions for improvement revise the developed product. The recapitulation of the expert evaluation results is shown in Figure 8 below:

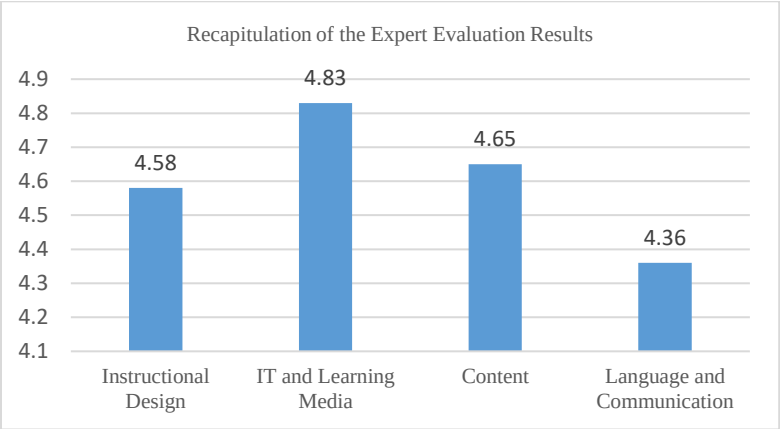

Figure 8: Recapitulation of the Expert Evaluation Results

Three Stage Testing

Product trials in the field are carried out by involving students in the Information Systems Study Program. The test was carried out in three stages: One-to-One, Small Group, and Field Trial. The One-to-One evaluation was carried out with three students who had already taken the

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Information System Analysis and Design course with the criteria of one student getting an A grade, one student getting a B grade, and one student getting a C grade. The small group was conducted with nine students who have taken the Information System Analysis and Design course with three levels of ability, namely three students with high skills, three students with average skills, and three students with low skills. The Field Trial involved 20 students who had never taken Information Systems Analysis and Design courses.

Revision

The evaluation results at each stage are used to improve the product before testing at the next step. The summary of the results of the One-to-One evaluation can be seen in Figure 9 below:

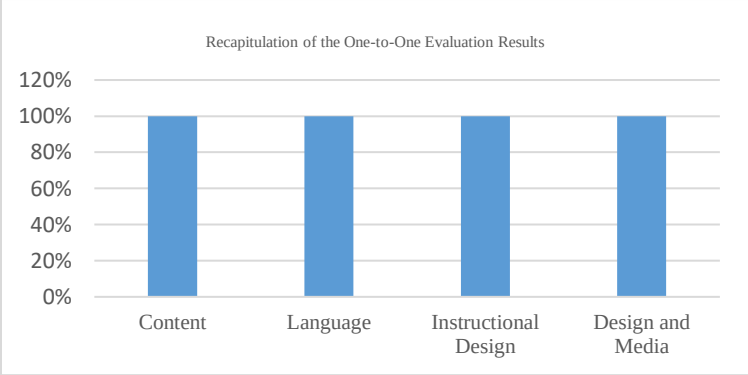

Figure 9: Recapitulation of the One-to-One Evaluation Results

There is a revision of the One-to-One evaluation, namely the design tools should be uploaded to the Collassion Learning-App so that students do not need to download it from other media, so that a Download menu is added which contains applications used in designing the system and so that it does not violate the Information Law and Electronic Transactions are selected design applications based on open source.

The summary of the results of the Small Group evaluation is shown in Figure 10 below:

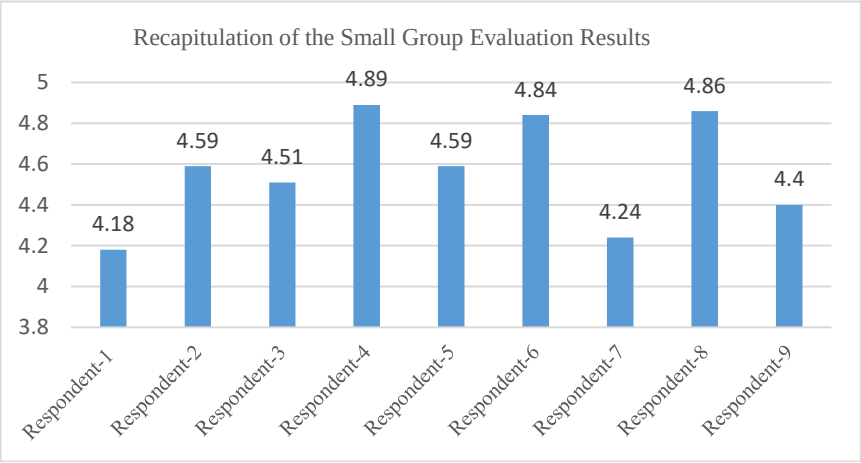

Figure 10: Recapitulation of the Small Group Evaluation Results

In the Small Group evaluation, there were no revisions. The nine students in this evaluation said that the Information System Analysis and Design learning model based e-PBL using Collassion Learning was very good. The Collassion Learning-App also had the features needed in learning, emphasizing collaboration and discussion.

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The results of the Field Trial evaluation are shown in Figure 11 below:

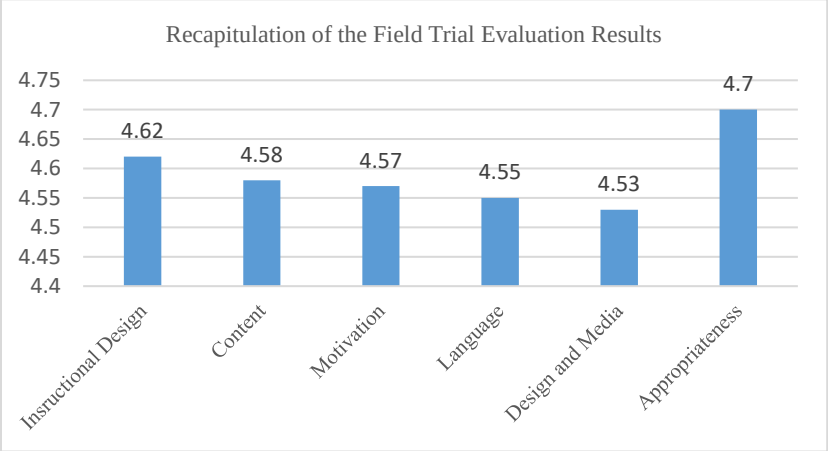

Figure 11: Recapitulation of the Field Trial Evaluation Results

The following table summarises the findings of the formative evaluation of the development of learning models Analysis and Design of e-PBL-based Information Systems with Collassion Learning as a whole, as well as the criteria:

Table 1: Recapitulation of the Formative Evaluation Results

No	Evaluation	Score Average	Criteria
1	Content Expert	4.58	Very Good
2	Language and Communication Expert	4.83	Very Good
3	Instructional Design Expert	4.65	Very Good
4	IT and Learning Media Expert	4.36	Very Good
5	One-to-One with three students	100%	Very Good
6	Small-Group with nine students	4.57	Very Good
7	Field Trial with 20 students	4.59	Very Good

Effectiveness Testing

The effectiveness test of the e-PBL-based Information System Analysis and Design learning model using Collassion Learning was conducted by comparing the pre-test results with the post-test results.

Analysis

The analysis was carried out by comparing the results of the pre-test and the post-test, where the average pre-test score was 67.35 and the average post-test score was 87.75; the average pre-test score was 67.35 and the average post-test score was 87.75. Learning outcomes have improved by 20.40 percent as a result of the e-PBL-based Information System Design and Analysis learning model using Collassion Learning, leading to the conclusion that the model has been shown to be effective in enhancing learning outcomes. To assess whether there is a statistically significant difference in the rise between the pre-test and post-test, a significance test of the difference between the mean pretest and post-test was performed using the SPSS statistical programme. When the t-test is used to analyse the data, the findings of the t-count are -4.024, which is statistically significant at the 0.001 level. The t-table with N=20 has a value of 3.55181, which is a significant number. It is possible to conclude that there are significant

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differences in learning outcomes before and after utilising the e-PBL-based Information System Analysis and Design learning model that incorporates Collassion Learning because the t-count is smaller than the t-table in this study.

The Final Product

The results of the analysis of the effectiveness test state that the product developed are effectively used to improve learning outcomes for the Information System Analysis and Design course as the basis for deciding that the product has been developed and is ready to be implemented in the learning process which also indicates that the research phase has ended.

The results of this study are in line with previous research that blended PBL has a significant effect on critical and creative thinking skills and improves student learning outcomes (Hidayati et al., 2020) (Nurkhin et al., 2020). E-PBL that is fully implemented or blended is more effective than traditional PBL because of the attractiveness, accessibility, and effectiveness of PBL, which can improve communication, collaboration, and independent learning skills (Tudor et al., 2019). The PBL model supported by technology has a higher impact than the traditional PBL model and significantly affects student cognitive learning outcomes (Setyawan et al., 2020).

Collassion Learning-App, a support system in the developed model, presents modules, teaching materials, videos, and practice questions, also allows students to collaborate and discuss outside class hours. This is by the results of research conducted by Bahar et al (Bahar et al., 2020) that support information and communication technology-based applications in the form of a content management system/Moodle application is not effective enough to keep PBL-based learning strategies. Learners need information and communication technology with more features that help outside the classroom to support collaboration (groups) and independent learning resources. In addition, in the Collassion Learning syntax that was developed, there is still a separate learning phase to solve the weaknesses of the PBL model in general, which only places individual learning in small portions or even none at all (Bahar et al., 2020).

Conclusion

Based on the research results, it is proven that the e-PBL-based learning model using Collassion Learning effectively improves students' higher-order thinking skills in analyzing and designing information systems and improves student learning outcomes in the Information Systems Analysis and Design course.

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