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Application of Blended Learning Models in Logic and Mathematical Reasoning Courses

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Abstract: The purpose of this study was to determine the application of the blended learning model in logic and mathematical reasoning courses. Pre-test in groups-Post-test research The design of the application of the experimental method is in the form of a pre-experimental research design. The population of this study were students in the mathematics education subjects of University x, logic and mathematical reasoning. The samples in this study were Morning Class A students in the subjects of Logical and Mathematical Reasoning. This instrument consists of several tests of logical and mathematical reasoning questions. The results showed that the application of the mixed learning model to mathematics and logic material increased student achievement. Student achievement before being given the blended learning model is low. The student's score after receiving the blended learning model is considered good.

Keywords: Blended Learning; Learning Models; Students Logical Understanding and Reasoning

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INTRODUCTION

Education is a learning environment that allows students to utilize their religious potential for spiritual strength, self-control, personality, intelligence, noble personality, and shared skills, society, nation and nation. create a learning process that is needed and actively developed. On the other hand, the function and purpose of education is to develop competence in the context of educating people's lives as regulated in Law Number 20 concerning the National Education System of 2003 and to form a capable personality and national civilization, develop the potential of students to become human beings of faith. and pious, become citizens who are almighty, noble, healthy, knowledgeable, capable, creative, independent, democratic, and responsible. Definition,[1].

From school to college, the education that students receive should be an experience that they can use to support their lives and survival. The task of the teacher here is not just teaching (teaching), but teaching (learn) and paying more attention to learning. Learning doesn't just happen in science. The direction of learning should focus on learning as determined by UNESCO; (1) learning to know, which also means learning to learn; (2) learning to do; (3) learning to be; and learning to live together. Experience can contribute to what has been learned so that later students will be able to solve any problems that arise[2].

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In the course of logical reasoning or in the sense science that studies reasoning, a way of thinking by developing something based on reason, not based on feelings or experience, requires an effective learning model.

Blended learning is a learning activity that combines classroom activities with learning activities through internet media. In applying it, blended learning reduces direct contact with students studying at school. In general, the purpose of blended learning is for students to learn more actively and independently without shortening class time. Using computer-based technology, teachers apply a mixed model, or most often a hybrid model[3]. Therefore, it can be concluded that blended learning is learning that combines face-to-face learning and e-learning-based learning until the expected learning outcomes are achieved with the basic principle of being able to optimize oral communication in face-to-face education and written communication in online learning.

This learning model is very suitable to be used for e-learning-based materials such as logic and mathematical reasoning material, so applying the Blended Learning learning model to this material is very appropriate because this course is very interested in virtual world examples to generate high interest in learning among students. . So it is hoped that this material will be easier to understand, armed with traditional learning and discussions with peers[4].

Based on the facts in the background, the researcher wants to apply the blended learning model to the courses of logic and mathematical reasoning. This research is expected to produce one of the appropriate learning models to be used by University x students. The purpose of this study was to determine the results of the application of the blended learning model in learning to think logically and mathematically. In particular, this study increases the success of mathematics learning after applying the mixed learning model in the context of logic and mathematical reasoning, and mathematics learning performance after applying the mixed learning model to the logic and mathematics course. The idea is to measure the extent to which mathematics learning achievement increases after the implementation of this learning model.

Brew stated that blended learning is a learning approach that combines online and face-to-face learning to provide more effective learning[5]. Izzudin who stated that blended learning is learning that combines direct learning with virtual learning[6]. Pujianto stated that blended learning can be used as a type of learning that is effective, efficient and able to support the structure of the student learning community because in blended learning there are interactions where students can see themselves as a community that unites with each other in a positive way.[3].

Research result Afria shows that students have excellent mathematical communication skills in mixed learning[7]. And research on the effect of learning using the Blended Learning model was also carried out by Sjukur. This research shows that the application of blended learning increases students' motivation and learning outcomes.[5].

According to research Noraharja, blended learning can increase awareness and by using blended learning in combination with intermolecular teaching materials shows excellent learning outcomes[3].

From research results Yaniawati, There is a significant difference in mathematics performance between full e-learning, mixed learning, and teacher candidates who learn through traditional learning. The mathematical performance of students with mixed learning is superior to other forms of learning (complete e-learning and traditional learning)[8].

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In line with the results in Jayanti and 's research Ningsih, from the results of her research, she concluded that the mixed learning model has a major influence on student learning outcomes in the differential equations course.[9].

However, according to Lewis, blended learning is required and understood that it cannot completely replace learning activities. Mixed learning can be a great addition to your classroom learning model or as a powerful tool for your enrichment program[10]. Fajar Sadiq stated that reasoning is the process of trying to connect known facts with new conclusions or statements. The basis of thinking itself is logic, which is a way of measuring the accuracy of thinking and drawing conclusions. Blended learning is suitable for use in e-learning-based materials, and in logic and mathematics courses[11].

According to Keogh's research, the potential benefit of blended learning is the ability to access and work to meet learning needs at a given pace and time and Bibi's research found that increased understanding of students using blended learning is learning-based versus traditional learning.[12].

METHODS

The method used in this research is the experimental method. Data collection requires specific ways to achieve the desired expectations and goals. According to Sugiyono, "Research methods are generally defined as scientific methods to obtain data for certain purposes or uses." The research method used is pre-experimental design, but this design is not yet a real experiment because of the external variables that affect the formation of the dependent variable. Therefore, the experimental results which are the dependent variable are not only influenced by the independent variable[13]. Sugiyono also stated that there were four studies based on experimental methods. (1) Pre-experimental design; (2) Actual experimental design; (3) factor design; (4) Quasi-experimental design. The form of survey used in this survey is a pre-experimental design using a pre-test-post-test survey planning group.

The subjects of this study were students of the X University Mathematics Study Program, especially those who took courses in logical and mathematical reasoning. The sample in this study were students of class A morning class for reasoning and mathematics. The data collection method in this study is a measurement method that uses tools in the form of logic testing and mathematical reasoning. Then also includes documentation techniques by collecting the required documents.

Data analysis techniques to obtain research-oriented data to improve mathematics learning performance after applying the mixed learning model in logic and mathematics inference courses. Hypothesis testing using the analytical prerequisite test is carried out in the following ways: 1) The normality test uses the Liliefors formula. 2) Uniformity test with F-test Analytical test with test according to the rules (in case of striking or non-uniform events). The Mann-Whitney test statistic is used to find out how much improvement is seen when applying the mixed learning model to logic and mathematics courses.

RESULT AND DISCUSSION

The data collected and analyzed in this study is the result of student achievement in learning mathematics logic introductory material with and without blender learning. The research was conducted on a certain sample, namely the students of the second semester of Mathematics Didactics with a total sample of 31 students. The research was conducted in the form of preliminary material, basic concepts of mathematical logic, namely giving statements or

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statements, notations or truth values. After presenting the introductory material, students get a preliminary test of the material given.

In this study, it can be seen from the p . Data students learning achievement using introductory mathematical logic without blended learning was measured using a learning success interval given a pretest. It showed that 15 students were classified as failing, which means that up to 50% of the sample failed. Coupled with an average of 52 learning outcomes which are classified as low, this shows that students' scores are generally not focused on categories. However, the standard deviation of the students' pretest scores was 17.67, and the difference between the data was still large enough to conclude that students made a significant difference in material intake. Then, after studying further material through blended learning, no more students failed. Only two people lost their scores. Students in this category performed well, as the average also increased to 72. This is supported by a standard deviation of 8.798. This means that the difference between students is less than 10 around the average.

Therefore, after applying blended learning, student achievement improved descriptively. The increase occurred in the number of students who achieved learning achievement, the average learning outcomes, and the categories received by each student. In addition, student scores tend to increase evenly, as evidenced by the small standard deviation values.

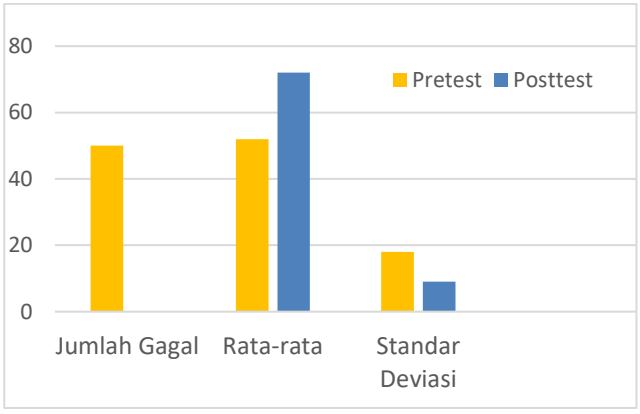

Figure 1: Decrease and Increase Graph

Based on the results of the post-test normality test of this study, the Lobs-L table value (0.1606 <0.1933) so it can be concluded that the data is normally distributed. The homogeneity test used the F test. In this study, the researcher used the F-test because the data in this study consisted of two data sets, pre-test and post-test value data. Means variance. For Fcount Ftable, the data is homogeneous, but for Fcount Ftable, the data is not homogeneous. Based on calculations using the F-test, the value of Fcount < Ftable or 1.0864 < 2.1242, the data is said to be homogeneous.

Based on the research data, testing the difference between the PostTest results from the data normality test using the Lilliefors test and the uniformity test using the F test shows that both data are normally distributed and the variance is uniform. Use the two-way student t-test to analyze the following steps.

Based on the results of the calculations in this study in accordance with the existing formula, Ho was rejected at a significance level of 5. This means that H1 will be accepted and H0 will be rejected. So in conclusion, mathematics learning achievement increases after the

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blended learning model in the context of logical and mathematical reasoning. The results of the t-test showed that there was a significant increase between the average student learning outcomes before and after the modification of learning in the Flash program when performing arithmetic operations on integers.

The implementation of research in the Mathematics Research Program at University x generally went well, starting with a field survey of researchers who found problems that needed to be investigated, providing introductory material, and pre-testing and follow-up. Until the final test stage (post-test). All students were present when the researcher's research was conducted. The average student learning achievement from the results of the pretest which is a pre-blend learning test is classified as not good because students do not look so enthusiastic during the learning process, thus affecting their learning achievement. In addition, one-way learning, unlike mixed learning, makes learning somewhat passive for students. Because the mixed learning model provides, learning can be achieved by using a mixed learning model that combines all existing media, both face-to-face learning and online distance learning. Students have the opportunity to ask questions that are widely available as long as they are appropriate to the learning context, namely mathematical logic.

The second meeting provided students with additional material called basic logic devices, and the third meeting conducted a pre-test to determine the performance of students who studied directly as a test before learning mixed rice fields. We received some results from the survey based on the results of data processing. In other words, the results of the first survey assessed the average students who performed poorly on the pretest. This is the proposal for blended learning using a learning model. This allows students to learn, engage in learning activities, discuss, ask questions, and understand the material presented.

Based on the hypothesis, it can be concluded that after the application of the blended learning model in logical and mathematical thinking courses, mathematics learning outcomes will increase significantly. During the learning process The learning process is about the process, not the end result. The curriculum emphasizes the involvement of students and teachers as moderators. Because mathematics learning focuses on students' thinking processes and outcomes, based on learning outcomes based on the constructivist principles above, the mixed learning model is suitable for learning activities. In addition, this learning takes the initiative and communicates with students to find answers to contextual questions they face by encouraging themselves and students to engage in learning activities.

This shows that student learning is carried out through various sources and learning activities. so Prayitno stated that blended learning is learning that must be done. Mixed learning that requires learning activities leads to an increase in student learning performance in the subjects of logic and mathematical reasoning[14]. And Muchtadi et al's research found that student activities and learning outcomes when students were good. learning activities are followed by good learning outcomes[15].

CONCLUSION

Based on comprehensive data analysis, it shows that research that applies the blended learning model in logical and mathematical thinking courses improves student learning performance and poor student performance before presenting the blended learning model, which is 52. After applying the blended learning model, student performance is considered good, or 72. The results of the hypothesis test also show that student achievement increases after using the blended learning model. Improved mathematical thinking processes and student performance after receiving a mixed learning model of logic and mathematics

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teaching materials with a high value of 1.132. Therefore, the mixed learning model is very suitable for learning activities because mathematics focuses on students' thinking processes and outcomes.

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