

Effectiveness of *vaksin* assisted blended learning model on student learning outcomes in geometry

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Abstrak: The purpose of this study was to prove whether the blended learning model assisted by VAKSIN (*Video Animasi untuk Sistem Pembelajaran Online/Video Animation for Online Learning Systems*) is more effective than the online learning model on student learning outcomes in the fourth semester of the Mathematics Education Study Program. The posttest only control design was carried out in the Geometry course at IKIP PGRI Bojonegoro for the 2021/2022 academic year. This study used a saturated sampling technique where all members of the population are used as samples. Data collection techniques in this study used documentation and test techniques. Test the hypothesis used t-test. The results of data analysis obtained by testing the hypothesis in the experimental class and control obtained $t_{count} = 3,18219098$ dengan $t_{table} = 1,99084707$. Karena $t_{count} > t_{table}$ hence H_0 is rejected so it can be concluded that the learning outcomes of the fourth semester students of the Mathematics Education Study Program of IKIP PGRI Bojonegoro who were subjected to VAKSIN-assisted blended learning were more effective than those who were subjected to online learning.

Keywords: VAKSIN Assisted Blended Learning Model; Learning Outcomes; Geometry

Efektivitas model pembelajaran blended learning berbantuan vaksin terhadap hasil belajar mahasiswa pada mata kuliah geometri

Abstrak: Tujuan penelitian ini untuk membuktikan apakah model pembelajaran blended learning berbantuan VAKSIN (*Video Animasi untuk Sistem Pembelajaran Online*) lebih efektif dibandingkan dengan model pembelajaran online terhadap hasil belajar mahasiswa semester IV Program Studi Pendidikan Matematika. Desain posttest only control dilaksanakan pada mata kuliah Geometri di IKIP PGRI Bojonegoro tahun akademik 2021/2022. Penelitian ini menggunakan teknik sampling jenuh dimana semua anggota populasi dijadikan sebagai sampel. Teknik pengumpulan data dalam penelitian ini menggunakan teknik dokumentasi dan tes. Uji hipotesis menggunakan t-test. Hasil dari analisis data diperoleh uji hipotesis pada kelas eksperimen dan kontrol diperoleh $t_{hitung} = 3,18219098$ dengan $t_{tabel} = 1,99084707$. Karena $t_{hitung} > t_{tabel}$ maka H_0 ditolak sehingga dapat disimpulkan bahwa hasil belajar mahasiswa semester IV Program Studi Pendidikan Matematika IKIP PGRI Bojonegoro yang dikenai pembelajaran blended learning berbantuan VAKSIN lebih efektif daripada yang dikenai pembelajaran online.

Kata Kunci: model pembelajaran blended learning berbantuan vaksin; Hasil Belajar; Geometri

INTRODUCTION

The covid-19 pandemic that started in the city of Wuhan and spread to almost all countries, especially Indonesia since the beginning of 2020 (Hasanudin et al, 2020). This pandemic affects one sector, namely education which has an impact on the migration of the learning process from face to face to face to face. This migration certainly creates a culture shock from teachers, students, and guardians of students, where the learning system must be implemented online. Online learning has both positive and negative impacts. The positive

impact is that students can learn anytime and anywhere. However, the negative impact can be from various factors, both teachers, students, and existing facilities.

The results of Baety and Munandar's research show that 63% of respondents stated that the implementation of online learning has not been effective (Baety & Munandar, 2021) this is due to internal and external factors (Kusmaharti, 2021). Internal factors such as students feel lazy, sleepy, bored (Jatmika, 2020), low learning motivation, and low physical health conditions (Murti et al, 2021). External factors such as the family economy (Kholisho & Marfuatun, 2020), teachers are less effective when delivering material (Jannah & Santoso, 2021).

The ineffectiveness of the online learning process is also felt by students when learning geometry material. Based on the results of interviews in 2020 and 2021 between researchers and students in IKIP PGRI Bojonegoro, 80% of students feel uncomfortable learning geometry online. One of the reasons is that the lecturers do not provide variations in the online learning that is carried out so that students cannot study intensely independently so that it is difficult to solve geometric problems.

Problems faced by students must be immediately found a solution considering the ability to solve geometric problems is very important for students. Geometry material can provide opportunities for students to think about important concepts in mathematics (Hollebrands, 2003), think critically (Fauzi & Arisetyawan, 2020) encourage intuition, visualization, deductive reasoning, problem solving, logical proof, and student arguments (Jupri, 2017)(Seah, 2015).

So that students can still have problem solving skills in geometry optimally, the researchers will applied a blended learning learning model with the help of VAKSIN (*Video Animasi untuk Sistem Pembelajaran Online/Animated Video for Online Learning Systems*). Blended learning can be interpreted by the combination of media and tools used in the e-learning environment (Whitelock & Jelfs, 2003), the existence of the best media for delivering modules (Hofmann, 2001). Blended learning that will be developed in this research is not offline (face-to-face) and online (online). However, it is more in the implementation of online learning by optimizing virtual synchronous and asynchronous collaborative and independent. The following presents the concept of developing a blended learning model with the help of VAKSIN.

To optimize independent asynchronous activities, the Blended learning model will be packaged with the help of VAKSIN on the Moodle LMS. Moodle as a dynamic learning place (Munir, 2012) that makes it easy to build a learning community (Hidayati, 2016) because it is simple, efficient, compatible with many browsers (Amiroh, 2012), there are online discussion forums (Syahringsih & Adnan, 2018), online exams (Abar & Carnevale, 2019), and practical (Pratiwi & Silalahi, 2021) so that it can be accepted by students (Pratiwi et al, 2014). IKIP PGRI Bojonegoro already has a Moodle LMS which can be accessed on the <https://lms.ikipgribojonegoro.ac.id/> page so that it can carry out one of the MBKM programs, namely online student exchange.

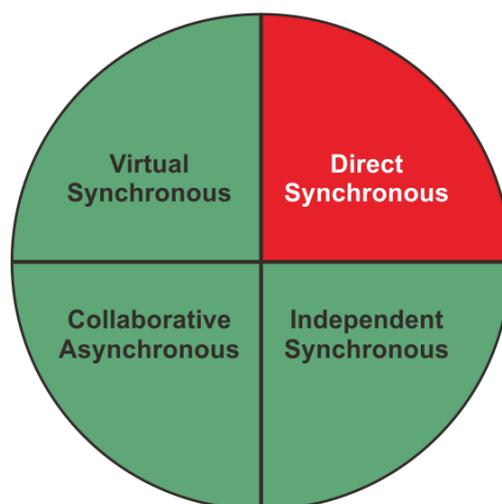


Figure 1. Learning Quadrants in the VAKSIN-Assisted Blended Learning Model

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LMS is a system of setting learning resources, assignments, evaluations, and monitoring the progress of learning outcomes as a whole (Folden, 2012). One of the LMS that can be used in an online learning system is the Moodle LMS (Suriyah et al, 2021). Some of the advantages of Moodle type LMS is that Moodle's safety has been guaranteed. This is because Moodle is equipped with security features that can protect users' personal data. Moodle has user management, such as course management, changing courses, subtracting, and adding course types. Moodle also provides chat bot modules, journal modules, quiz modules, survey modules, workshops, polls and many other modules.

The purpose of this study was to determine whether the VAKSIN-assisted blended learning model was more effective than the online learning model on student learning outcomes in the even semester geometry course at IKIP PGRI Bojonegoro. Based on the description above, it is very important to apply the VAKSIN-assisted blended learning model as an effective learning model in the 5.0 revolution era as a support for the implementation of MBKM. This research is expected to produce a collaborative and participatory learning design between lecturers, students and university partners through the VAKSIN-assisted blended learning model on the Moodle LMS.

METHOD

This research was carried out at IKIP PGRI Bojonegoro using a posttest only control design, where the research subjects were fourth semester students who teach geometry courses in the 2021/2022 academic year. This study used a saturated sampling technique. According to Budiyo (2003), saturated sampling is a sampling technique in which all members of the population are used as samples.

Documentation and test techniques are techniques used for data collection. Documentation technique is used to collect data on final semester exam scores in Calculus I, where the course is a prerequisite for teaching geometry courses. The final semester test scores are used to test the normality, homogeneity and balance of the sample class before being subjected to treatment. The test technique uses essay questions for quizzes before the UTS (mid-semester exam) as many as 5 (five) questions to collect data on student learning outcomes in the fourth semester in the geometry course to determine the ability to analyze and apply basic concepts of field geometry to solve mathematical problems; apply basic concepts in plane geometry, namely the concepts of points, lines, angles, planes, triangles, congruence, parallels and similarity, line equations, circles, ellipses, parabolas, and hyperbolas for solving mathematical problems; and understand the concepts of points, lines, angles, planes.

The data used for the prerequisite test is single data, so the test used is the normality test using the Liliefors method. While the homogeneity test used the Bartlett method. The balance test and hypothesis testing in this study used t-test. Hypothesis testing was conducted to prove the effectiveness of the application of the VAKSIN-assisted blended learning model on student learning outcomes in geometry courses at IKIP PGRI Bojonegoro.

RESULTS AND DISCUSSION

The research, which was conducted on fourth semester students of the Mathematics Education Study Program, IKIP PGRI Bojonegoro, for the 2021/2022 academic year, used a saturated sampling technique, where all members of the population were used as samples. In this case, there are two classes for fourth semester students which are divided into experimental class and control class.

The preparation of research instruments is arranged on a scheduled basis based on the research design that has been made by the researcher. The research instrument was prepared based on the Syllabus and lesson plans for the Geometry course in the previously mentioned sub-chapter. Before the instrument was used in the experimental and control classes, a trial was conducted on the sixth semester students of the Mathematics Education Study Program, IKIP PGRI Bojonegoro, who had taught geometry courses in the previous year. The trials conducted by the researchers included tests of validity, reliability, level of difficulty and discriminating power.

Data collection techniques used in this research are documentation and test techniques. Documentation data in the form of UAS scores for Calculus I courses in the previous semester. The Calculus I course is one of the prerequisite courses that must be taught by students before

taking the Geometry course. The UAS (Semester Final Examination) score for the Calculus I course taught in the third semester is used to carry out prerequisite tests before the experimental class and the control class are given treatment. Prerequisite tests carried out include normality test, homogeneity test and balance test.

The results of the normality test using the Lilliefors method (Budiyono, 2009) were carried out before the sample was given treatment in each group with a significance level of $\alpha = 5\%$ can be seen in Table 1 below:

Table 1 Normality Test Results Before Treatment

Groups	L_{obs}	L_{table}	Test Decision
Experiment	0,096672232	0,140089	Ho accepted
Control	0,074965061	0,140089	Ho accepted

Based on Table 1 for each group the value of $L_{obs} < L_{table}$ so H_0 accepted. It means that each sample comes from a normally distributed population.

Then the homogeneity of variance test with the Barlett method was carried out before being given treatment between the control group and the experimental group with a significance level of $\alpha = 5\%$. Based on the results of the homogeneity test analysis, it can be concluded that the variances of the experimental class and control class are the same (homogeneous) because $\chi^2 < \chi^2_{table}$, χ^2 is 1,721494 dan χ^2_{table} is 3,841.

After the normality and homogeneity tests have met the requirements, a balance test is carried out. The balance test in this study used a t-test with a significance level of $\alpha = 5\%$. The result of the calculation is the value of $t_{count} = 1,96714267$. The critical area (DK/*daerah kritis*) for this test is $DK = \{t \mid t < -1,99084707 \text{ or } t > 1,99084707\}$. Nilai $t_{count} \notin DK$ so H_0 accepted. Based on the results of the balance test analysis, it can be concluded that the experimental group and control group students have the same initial ability.

After the prerequisite test was carried out and all three (normality test, homogeneity test, and balance test) met the requirements, the next step was the sample was subjected to treatment in which the experimental group of the VAKSIN-assisted blended learning model and the control group used the online learning model. The following is presented in Table 2, student learning outcomes scores in the experimental group with the VAKSIN-assisted blended learning model and the control group using the online learning model.

Table 2 Geometry Learning Achievement Data

Groups	Average
Experiment	82,13
Control	72,50

Data in the table shows that the average score of students in the experimental group is higher than the average score of students in the control group. This is not enough to prove the effectiveness of the VAKSIN-assisted blended learning model. It is necessary to do a t-test in the

next step after treatment. Prior to the t-test, it is necessary to test for normality and test for homogeneity using student test scores after being given treatment. Berikut pada Table 3 results of the normality test using the Lilliefors method in each group with a significance level of $\alpha = 5\%$

Table 3 Normality Test Results After Treatment

Groups	L_{obs}	L_{tabel}	Test Decision
Experiment	0,100859378	0,161	Ho accepted
Kontrol	0,125488682	0,161	Ho accepted

Based on Table 3 for each group the value of $L_{obs} < L_{tabel}$ so Ho accepted. It means that each sample comes from a normally distributed population. Then the next step is to test the homogeneity of variance between the control group and the experimental group using the Barlett method using a significance level of $\alpha = 5\%$. Based on the results of the homogeneity test analysis, it can be concluded that the variances of the experimental class and control class are the same (homogeneous) because $\chi^2_{count} < \chi^2_{table}$, χ^2_{count} is 0,5500268 dan χ^2_{table} is 3,841.

After the normality test and homogeneity test, the next step is to test the hypothesis (Budiyono, 2009). Hypothesis testing in this study used t-test with separated variance formula. The level of significance that has been set is $\alpha = 5\%$. Value of $t_{table} = 1,99084707$ and value of $t_{count} = 3,18219098$. Value of $t_{count} > t_{table}$, hence Ho rejected and H_1 accepted. Thus, the results of the analysis of the hypothesis test can be concluded that the VAKSIN-assisted blended learning model is more effective than the online learning model on student learning outcomes in the fourth semester of the Mathematics Education Study Program of IKIP PGRI Bojonegoro in the 2021/2022 academic year.

Based on the results of data analysis, student learning outcomes of the experimental group were better than those of the control group. The learning process in the experimental group uses the VAKSIN-assisted blended learning model. Based on the results of this study, online lectures are learning that is carried out by utilizing technology through virtual applications and using the internet (Saifuddin, 2018). As a lecturer, it is expected to be able to understand in advance the learning tendencies or preferences of students by utilizing the right way or learning media that makes students interested in online learning (Zhafira et al, 2020), but students who do not have mastery of technological literacy media have online learning activities cannot run well (Khasanah et al, 2020).

Online lectures are a process of delivering learning materials that are not limited to time and place by using various technologies in an open, flexible, and distributed learning environment (Putra et al, 2020). However, in its implementation online lectures have a weakness, namely the lack of supervision during online learning (Sadikin & Hamidah, 2020) as in this study.

To optimize learning through Moodle LMS, the right learning model is blended learning, this is in line with the results of this study. This study is in line with the results of research by Wardani et al. who stated that the blended learning model can make students more active in the learning process and can make the learning process more enjoyable (Wardani et al, 2018).

Blended learning is a learning model that refers to learning that combines or mixes face-to-face learning and computer-based learning (online and offline) (Dwiyogo, 2016), but in its implementation in the four existing learning quadrants, blended learning can be implemented fully online through virtual synchronous and collaborative or independent asynchronous. To optimize independent asynchronous activities, it is necessary to innovate in the form of providing learning videos in the LMS. Learning videos can improve students' pedagogic and problem solving abilities (Santagata & Guarino, 2011).

CONCLUSION

This study concludes that student learning outcomes are treated with the VAKSIN-assisted blended learning model compared to the online learning model. Based on the description above, so that student learning outcomes are optimal in online learning, one of the efforts that can be done is to develop a blended learning model assisted by the provision of learning videos that support independent asynchronous activities for students. Blended learning that is packaged well in the implementation of virtual synchronous and collaborative and independent asynchronous with the help of video can support online learning effectively as well as the implementation of MBKM. The weakness of this research is that the scope of the subject was limited, so it is hoped that in the future it can be wider for the research subject and a conclusion can be drawn to make learning theory that can be used more widely based on the results of this study and further research.

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