Differences in the Effect of Offline, Blended, and Online Learning in Statistics Learning on Physical Education Students

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Abstract: The purpose of this study was to analyze the difference in the effect of learning carried out face-to-face directly or offline, learning carried out offline, online and blended learning. The research method was a quantitative method with a design experiment. This research was conducted in Ambon city, Maluku-Indonesia. The population in this study amounted to 118 Physical Education Student Sampling was carried out randomly to obtain the number of samples using Slovin's formula: $n=n/(1+ne^2) = 74$. Instrument used in this research is an essay test. The test scores from the two sessions were combined to get a total score of statistical learning outcome scores were analyzed using one-way ANOVA, but before being analyzed the scores were tested for requirements with homogeneity tests. The results of this study indicate that the learning carried out provides an overview of the different statistics learning outcomes based on the results of the F test with an F value of 7.131 and a p-value of 0.02. Based on the post-hoc follow-up test, it was found that the student taught by face-to-face or offline learning got better statistics learning outcomes than the students taught online, with a p-value of 0.02. Meanwhile, offline student statistics learning outcomes are not significantly better than student statistics learning outcomes taught using mixed methods or blended learning. Then, the statistics learning outcomes of students taught by mixed learning are not significantly better than online statistics learning outcomes. Thus, it can be said that learning that is carried out offline or face-to-face directly (Blended Learning) is still better and superior to learning that is carried out in Blended Learning and which is carried out online.

Introduction

Lives in the 21st century are greatly influenced by the development and advancement of information and communication technology (ICT). The sophistication of ICT has made the flow of information exchange very fast, and communication seems to be without boundaries. In everyday life, we can feel that the impact of the development of ICT has occurred in all aspects of our lives, including aspects of education. Education is now no longer exclusive to certain groups but is more accessible (Dhawan, 2020). Science and technology today are growing rapidly and have been used for their benefits in the field of education in Indonesia. The usefulness of this technology is very useful during a pandemic. During the Covid-19 pandemic, the world of education from various levels was 'forced' to adapt drastically to learning from home through online media (Kundu et al., 2021).

Online learning, open learning, web-based learning, computer-mediated learning, blended learning, m-learning, for ex.) have in common the ability to use a computer

connected to a network, that offers the possibility to learn from anywhere, anytime, in any rhythm, with any means" (Singh et al., 2021). Online learning is a system that can facilitate wider, more numerous and varied students. Online learning in Indonesia began to be felt from the independent learning process. Independent learning emphasizes learning through all sources that can be supported with minimal assistance from others. Fully online learning requires several prerequisites for students, namely: 1 ICT literacy, students must have initial skills in the form of basic ICT mastery as a tool for learning, 2) Independence, online learning requires students who are accustomed to independent learning, 3) Your creativity critical thinking, online learning facilities are very diverse, students can learn various available tools such as browsing, chat and others, this requires students' creativity to take advantage of everything optimally.

Online learning is a growing educational alternative way for students who learn at university or in senior high school due to time and space constraints cannot attend a face to face classes (Estévez et al., 2015). Online learning is a system that can facilitate wider, more numerous and varied students. Online learning in Indonesia began to be felt from the independent learning process. Independent learning emphasizes learning through all sources that can be supported with minimal assistance from others. Fully online learning requires several prerequisites for students, namely: 1 ICT literacy, students must have initial skills in the form of basic ICT mastery as a tool for learning, 2) Independence, online learning requires students who are accustomed to independent learning, 3) Your creativity critical thinking, online learning facilities are very diverse, students can learn various available tools such as brosing, chat and others, this requires students' creativity to take advantage of everything optimally (Saboowala & Manghirmalani Mishra, 2021). Offline is the meaning of the term offline. Offline is an outside network or those that are disconnected because they are not covered by the internet network (Reich, 2017).

Regarding the impact of the spread of the Covid-19 virus on the world of education, it requires educators and students to be able to adapt quickly to existing changes. The learning system, initially based face-to-face directly in the classroom, must be replaced with an integrated learning system through the virtual internet network (online learning). Online learning connects learners (students) with their learning resources (data bases, experts, instructors, libraries) who are physically separated or even far apart but can communicate, interact or collaborate (directly, synchronously and indirectly, asynchronously). Online learning is a form of distance learning/training that utilizes telecommunications and information technology, such as the internet and CD-ROM (directly and indirectly) (Zimmerman & Kulikowich, 2016).

In line with this, Malyana explained that the online learning model is classified as a new learning model developed to deal with learning activities from home during the COVID-19 pandemic. The online learning model is a learning model that utilizes an internet-based interactive model and a learning management system (LMS), such as using the online zoom application, google meet, google drive, and so on. The online learning model is learning carried out remotely by utilizing digital technology as a communication tool and a medium for distributing subject matter. Therefore, it can be said that online learning is a combination of distance learning and e-learning (Zalat et al., 2021). Online learning allows students to have the flexibility of learning time to study anytime and anywhere. In addition, students can interact with lecturers using e-classroom, video conference, telephone or live chat, zoom or WhatsApp group (Muthuprasad et al., 2021). In other words, the success of a model or learning media depends on the characteristics of the students. Nakayama explains that all

literature indicates that not all students will be successful in online learning. It is due to differences in learning environment factors and student characteristics (Amir et al., 2020).
For students, online learning is an alternative method that does not require them to be present in class. In addition, this learning will form a spirit of independent learning and encourage student interaction. It is primarily for students who are usually not actively speaking, so they can more freely express their opinions/questions via writing if online learning is carried out. As for lecturers, online learning methods change conventional teaching styles, which can later improve work professionalism. The online learning model also provides opportunities for lecturers to assess and evaluate each student's learning progress more efficiently because they can interact directly and have a track record (Armstrong-Mensah et al., 2020)

The development of knowledge and technological advances unknowingly blurs the distinction between traditional and online educational settings. There are still many differences between those doing learning. These differences help compare the two settings for adult learners considering online and offline education as a learning pathway. In traditional educational settings, each lecturer and student physically go to the location (campus) and follow the learning. The term instruction is homogeneously used to represent such instructional and learning settings. Instead, several terms are used to refer to instruction and learning delivered through online methodologies. Online learning, virtual learning, web-based learning, technology-based learning, e-learning, network-based learning, and computer-based learning emphasize more on learning technology and the tools used. Asynchronous learning reflects the reliance on time-delayed communication and flexibility in timing. Sometimes, learning approaches such as individual guided studies are used to describe these non-traditional learning environments. Among these terms, e-learning is most widely used in corporate settings. It is defined as delivering content through all electronic media (Beinicke & Kyndt, 2020). The concept of blended learning is derived from two words, blend and learning. The word blend means combining things and learning denotesan assimilation of new knowledge (Tshabalala et al., 2014).

Technology is implemented to create an interactive online environment for generating communications, presentations, simulations, and demonstrations.   meaningful learning experience through an interactive learning environment and reliable technology will only be sustainable if there is an organization with a clear vision, strategy and support for online education. Among the factors identified through the literature, institutional support, faculty support, and assessment and evaluation are particularly relevant to this issue. Maintaining and refining an effective online program requires substantial human and financial resources. Organizations must provide various services to students and course instructors to maintain and promote effective online teaching and learning. Student support includes access to library and study resources, facilities, administrative assistance with admission, registration, and textbook information, and technical support throughout the course.

Technological developments and advances encourage students to be creative and innovative and seek to make changes. Creative changes and innovations continue to be carried out in designing and implementing online learning and with various experiments to improve the quality of education. One is through blended learning, where learning uses blended methods. This learning is expected to make it easier for students and lecturers to interact. Educational interactions that are intentionally carried out to achieve the desired goals through blended learning can help students not consistently or routinely come to campus. However, learning is designed in such a way that it can run face-to-face and also online. Offline learning is a learning modality that refers to modular learning, mobile learning, distance learning, and self-learning. Offline learning is observed when students are involved

in learning through either printed or electronic or digital modules. In this context, the role of technology is only to let students download learning materials and submit the results. In addition, offline learning is self-directed because it learns without the guidance of an instructor and allows students to learn to be responsible for their learning (Rapanta et al., 2020). Offline learning is a learning modality that refers to modular learning, mobile learning, distance learning, self learning, and independent learning (Batulan et al., 2022).

The birth of methods and even new learning models, along with the conditions and developments of science and technology, raises a big question for educators about which one is more appropriate to use in educational interactions because not all methods, models or strategies can be used in a particular lesson or teaching material. Instead, it needs to be adapted to the characteristics of the material being taught. Mixed learning or blended learning is a combination of traditional classroom learning with technology-based learning or is a learning system that combines face-to-face learning with online learning (Howard, 2021). Blended learning is applied to make it easier for students to get material delivered by lecturers either face-to-face or online using the internet network (Fitzgerald et al., 2022). In addition, it is one of the best ways to learn during a pandemic (Lockee, 2021).

Blended learning is currently being discussed a lot because it can be applied to all forms of learning, along with technological developments, the scope is getting wider, so many studies confirm the role of blended learning in education. In other words, blended learning means combining the advantages of e-learning and face-to-face practice (Bamoallem & Altarteer, 2022) . Blended learning can reduce costs for teachers, students, and institutions. Teachers and students can benefit from less travel time, transportation savings, and less parking costs (Agnelli et al., 2022).

Offline learning is a learning that requires face-to-face and does not require an internet network as a learning tool. Offline learning activities also do not require computers and laptops because the types of activities are writing and collecting work (Bolatov et al., 2022). Offline learning is commonly known as traditional learning that provides a face to-face learning activity in a conventional face to-face classroom setting (Liu et al., 2022).

Many studies are currently being conducted to compare online and offline learning. However, the results vary, so it cannot be concluded that one of the learning methods outperforms other methods studies are currently being conducted to compare online and offline learning. However, the results vary, so it cannot be concluded that one of the learing methods outperforms other methods. The results of his research show that the scores of students taught through the Mixed Method are significantly better than the scores of students taught through the Traditional Method. It is different than the results of a study conducted by Chen et al., (2022) with the aim of knowing the effectiveness of online and offline education in universities where the results of the research show that the findings indicate that the effectiveness of online education is dismal, because students find it difficult to adjust to the mode of education. online and offline mode of education remains the most preferred mode of education. so it cannot guarantee that one learning method outperforms other learning methods. It implies that is very important to conduct further research online, offline and blanded learning methods. According to Li et al. (2021), blended learning means different things to different people. The meaning of the term constantly evolves as it incorporates new concepts along with each new technology, thus illustrating blended learning's potential for growth. Driscoll further explains that blended learning may take the form of combining modes of web-based technology, pedagogical approaches, instructional technologies, and actual job tasks.

The birth of methods and even new learning models along with the conditions and developments of science and technology raises a big question for us as learners which one is more appropriate to use in educational interactions?. As we all know that not all methods, models or strategies can be used in a particular lesson or teaching material but need to be adapted to the characteristics of the material being taught. Thus, it is interesting to conduct research to find out how to apply online, offline and blended learning models in lectures, especially in statistics courses for physical education students, FKIP UNPATTI. Statistics is the science or method (way) or rules used to collect data, process, present, analyze or interpret data, and draw conclusions based on the data. Furthermore, it is said that statistics can be classified based on (1) the orientation of the discussion, (2) the phase or purpose of the analysis, (3) distribution assumptions, (4) the number of dependent variables. Statistics is a collection of facts in the form of numbers arranged in the form of a list or table that describes a problem. Statistics is knowledge about data collection, data classification, data grouping, drawing conclusions, and decision making (Tishkovskaya & Lancaster, 2012). The conclusion is that statistics courses need to get more attention in their application so that they can instill some knowledge for students. The Statistics course is considered important because every student in the preparation of a thesis will rely heavily on statistics both when compiling, processing, analyzing to drawing conclusions.

Research Method

This study used a quantitative descriptive research method with an experimental design to see the difference in the effect of offline, mixed and online learning. The learning material that was experimented with was statistics material. Direct or offline learning that had been used was used as a control group of the experimental group, namely experimental group 1, which is taught using a combination of offline and online or mixed learning (Blended Learning) and experimental group 2, which is taught indirectly (online). We can see the experimental research design in table 1 below:

Table 1. Research Design

Group / Variable	Independent Variable	Dependent variable (Performance)
Control	Offline	T
Experiment 2	Mix	T
Experiment 3	Online	T

The population in this study was students of the Education Study Program of Physical, Health and Recreation, Faculty of Teacher Training and Education, Patimura University, Ambon. The affordable population in this study was 118 physical education students, batch 2020/2021 with a sample of 74 students. The research sample was taken by simple random using Slavin's formula, namely: $n=n/(1+ne^2) = 74.21$. Thus, 74 students were taken as samples with details of 38 men and 36 women who were spread evenly in 3 classes or experimental groups.

From a population of 118 students with a sample of 74 students, they were grouped into three classes or groups of students who were experimented with in this study to see the effect of applying offline or face-to-face learning directly, the effect of applying Blended Learning or mixed learning and the effect of applying online learning by taking into account the number of students. The number of offline and mixed students was greater than online because most students lived in the area around the campus, so it was easy to reach. However, online, the number of students was less due to internet network problems from students. The
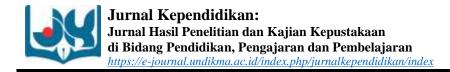
learning material was statistics with the subject of inferential statistics (correlation analysis, analysis of variance, and regression analysis). Each subject was studied in two meetings. The schedule for the implementation of the learning can be seen in Table 2.

Table 2. Statistics Course Schedule

	Statistics Material								
	Correlation Analysis			Analysis of Variance			Regression Analysis		
	1st week	2nd week	3rd week	4th week	5th Week	6th Week	7th week	8th Week	9th Week
Group A	Offline	Offline	Offline	Offline	Offline	Offline	Offline	Offline	Offline
Group B	Online and offline	Online and offline	Online and offline	Online and offline	Online and offline	Online and offline	Online and offline	Online and offline	Online and offline
Group C	Online	Online	Online	Online	Online	Online	Online	Online	Online

Before the students were grouped, an initial ability test was carried out on the basic statistics materials. They consisted of the types of statistical data, the presentation of the data in tables and graphs, the measures of convergence tendency, namely the mean, median, quartile mode, percentile decile, standard deviation and normal distribution. The principle of taking basic statistics material for the initial ability test assumed that students had received basic statistics material at high school and had taken test and measurement courses. The initial ability test instrument was arranged in the form of multiple choice by considering the difficulty level and differentiating power of the items. The results of this initial ability test were processed and analyzed for homogeneity. Learners or students whose test results were homogeneous were made into one group and then randomly selected by as many as 74 people. The selected students were instructed to form three groups according to their wishes. The three groups were coded with groups A, B, and C. After grouping, the learning process was carried out offline or face-to-face, face-to-face, blended, and online learning. After the learning process was completed, in the seventh week, a test was conducted using an essay test instrument regarding the three statistics materials taught: correlation analysis, variance analysis, and regression analysis. The test results data obtained were then compared using analysis of variance to find out whether there was a difference in the effect of the given learning model, namely offline, blended and online learning.

The Instrument used in this research is an essay test. The test asks the application of correlation analysis, analysis of variance, and regression analysis. The test was carried out after the learning ended for two sessions, the first session was a test to determine understanding of correlation analysis and analysis of variance and the second session was to determine understanding of regression analysis. The test scores from the two sessions were combined to get a total score of statistical learning outcomes. To compare learning outcomes between Offline, Blended and Online Learning, statistical learning outcomes scores were analyzed using one-way ANOVA, but before being analyzed the scores were tested for requirements with homogeneity tests.

Results and Discussion

Educational statistics were applied to offline learning, mixed or blended learning and online on students with teaching materials. This study was limited to inferential statistics with the subject of correlation analysis, analysis of variance, and regression analysis. Based on the tests given to students, the following information was obtained: The three groups of students were learning groups that were carried out offline, mixed, and online. The results were tested for homogeneity, the test results can be seen in Table 3.

Table 3. The Results of the Homogeneity of Variance

Levene Statistic	df1	df2	Sig.
2.761	2	71	.070

Table 3 illustrates that the test results of the three groups have a homogeneous variance (p-value = 0.07). This value is more significant than 0.05) so a comparative variance test can be performed. Furthermore, learning outcomes were processed using an analysis of variance. According to the analysis of variance, values such as Tables 4, 5, and 6 were obtained.

Table 4. The Results of The Analysis of Variance of The Three Learning Models

	Sum Of Squares	Df	Mean Square	F	Sig.
Between Groups	1720.600	2	860.300	7.131	.002
Within Groups	8565.454	71	120.640		
Total	10286.054	73			

Table 4 shows the analysis of the variance of the three models, namely direct or offline learning, mixed learning and online learning. In the table, the three lessons have a significantly different effect on the learning outcomes of statistics material at a significant alpha level = 0.05. This test produces a p-value of 0.02 (this value is less than 0.05). Based on the average values obtained, as shown in Table 5, the average learning outcomes with offline models are more significant than other learning models.

Table 5. Descriptive Statistical Test Results

	N	Mean	Std. Dev	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound	Min	Max
offline	27	78.4815	8.67964	1.67040	75.0479	81.9150	65.00	95.00
mix	27	72.9630	11.20261	2.15594	68.5314	77.3946	60.00	95.00
online	20	66.2500	13.26600	2.96637	60.0413	72.4587	50.00	95.00
Total	74	73.1622	11.87033	1.37990	70.4120	75.9123	50.00	95.00

Based on the results of the Post Hoc follow-up test, it turns out that the student statistics learning outcomes taught offline are better than the student statistics learning outcomes taught in blended learning, but it is not significant. It is known that the minimum score for offline statistics learning is 65. It is more significant than mixed or online and offline statistics learning, which is 60 and more significant than online statistics learning with a

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minimum score of 50. It indicates that offline minimum learning outcomes are better than mixed and online. It also implies that statistics learning, which was done mixed, is better than online. The difference in statistics learning outcomes can be seen based on the offline mean that is greater than the mix (78.4815>72.9630) with the standard deviation (8.67964<11.20261). The difference in the mean for statistics learning carried out online, and offline or mixed is more significant than statistics learning conducted online (72.9630>662500) with a standard deviation (11.20261<13.26637). Likewise, the mixed statistics learning outcomes are better than online learning outcomes, but this is not significant either. It differs from the case with offline statistics learning outcomes that are better than online learning outcomes. It is known that the offline means are more significant than the online mean (78.4615>72.9630) and standard deviation (8.67964<13.26600), with a significant difference at the significance level of alpha = 0.05. It is shown in Table 6.

Table 6. Post Hoc Test Results (Advanced Test Comparison of the Three Learning Models)

(I) Factors	(J) Factors	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
offline	Mix	5.51852	2.98937	.189	-1.9558	12.9928
	Online	12.23148*	3.24040	.002	4.1295	20.3335
mix	Offline	-5.51852	2.98937	.189	-12.9928	1.9558
	Online	6.71296	3.24040	.124	-1.3890	14.8149
online	Offline	-12.23148*	3.24040	.002	-20.3335	-4.1295
	Mix	-6.71296	3.24040	.124	-14.8149	1.3890

*. The mean difference is significant at the 0.05 level.

Tables 3 to 6 show that the results of statistics learning carried out online, offline, and mixed or blended learning is homogeneous. After the test or variance analysis was carried out, the results showed differences in statistics learning outcomes for the three groups of learners. (1) The difference in the mean of offline and mixed learning, (2) the difference in the mean of mixed and online learning, and (3) the difference in the mean of offline and online learning. There is a difference in the average statistics learning outcomes between groups of learners who were given offline, mixed, and online learning.

Educators in the 21st century still leave many demands to prepare professional graduates to face the era of a learning society. To deal with current demands in education, learning at school or in higher education which was initially carried out face-to-face, immediately switches to online learning using media that are considered suitable and mixed models. Although 20 years have passed, this situation seems to be still realistic today. The results of our study are still in line with the results of previous research. Learning media applied to online learning methods cannot affect learning outcomes for the better.

From the research results, it is known that the results of the post hoc test or further test to compare the three learning models applied, namely: (1) the comparison of the results of the offline mean of difference is better when compared to online learning (5.51852 and 12,23148 with a lower bound or lower limit -19558 and 4.1295) while the upper bluff (12.9928 and 20.3335) at alpha 0.05 (The mean difference is significant at the 0.05 level). It indicates that the mean offline learning outcomes are not significantly better than the average learning outcomes given the mixed model or blended learning. (2) The comparison of the results of a mixed mean of difference or blended learning is better when compared to online learning (-5.51852 and 6.171296 with a lower bound or lower limit of -12.9928 and -1.3890 while the upper bound is (1.9558 and 14.8149) in alpha 0.05 (The mean difference is significant at the

0.05 level). It can be seen that the average learning outcomes given the mixed model or blended learning are not significantly better than the average learning outcomes given the online model. (3) Unlike the case with the average statistics learning outcomes with the application of offline statistics learning, it is known to be significantly better than the average statistics learning outcomes given online. The results comparison of the mean difference between offline learning is better when compared to online learning (-12.23148 and -6.171296 with a lower bound or lower limit of -20.3335 and -14.8149 while the upper bound is (-4.1295 and 1.3890) at an alpha significance level of 5% (The mean difference is significant at the 0.05 level).

The results of the application of mixed learning (offline and online) or blended learning cannot outperform the learning outcomes carried out so far, namely offline learning. Even the results of statistics learning using online learning methods are not significantly better or worse than statistics learning outcomes using offline learning. Statistics learning outcomes in offline learning have the lowest value or low bound of 75.0479 and the highest value or upper bound of 81.9150. The difference in statistics learning outcomes carried out through blended learning or a mix (online and offline) was in the lowest value or lowered bound 68.5314 and upper bound 77.3946. Meanwhile, the results of statistics learning through online learning were 60.0413 for the lowest value or lower bound and 72.4587 for the upper bound. They were obtained with a significant difference at the significance level of alpha = 0.05. It can be seen in table 7 below.

Table 7. Statistics Study Results

Learning	Mean	Lower Bound	Upper Bound
Offline	78.4815	75.0479	81.9150
Mix	72.9630	68.5314	77.3946
Online	66.2500	60.0413	72.4587
	73.1622	70.4120	75.9123

Table 7 above shows that statistics learning outcomes empirically state that face-to-face or offline learning is still superior to blended and online learning. A significant difference can be seen from the average statistics learning outcomes through an offline application that is greater than the mixed and online learning outcomes (72.9630 < 78.4815 > 66.2500). The highest statistics score (upper bound) is also still the same, with the advantages of offline learning compared to mixed and online learning, namely (77.3946 < 81.9150 > 72.4587). Then, the lowest statistics score (lower bound) significantly shows the lowest statistics learning outcomes at online learning that is compared with statistics learning outcomes through the application of blended learning or offline (68.5314 < 75.0479 > 66.2500). The average statistical value shows that the statistics learning outcomes of students who were taught offline were above the average. On the contrary, the statistics learning outcomes of students who were taught offline were significantly below average, and the statistics learning outcomes of students in the application of mixed learning were below average but were not significant. These results indicate that offline learning is still superior to blended or online learning. Based on the results of the study, it can be said that in the future, the presence of learning carried out offline or through entire face-to-face is still needed and cannot be replaced entirely with mixed or online learning. Students feel that online learning has not provided a better experience and productivity in mastering competencies but can provide convenience in accessing learning resources (Hrastinski, 2019).

The presence of education through educative interactions, specifically with the actual learning process carried out face-to-face, directly or offline, is still needed to increase

students' enthusiasm for learning. Based on the results of this study, it can be said that online learning is only an additional option after face-to-face or offline learning cannot be implemented. The results of this study can prove that technology in the IT sector still has to be further refined with the availability of an adequate internet network to support the learning process so that offline and blended learning outcomes can be better than face-to-face or offline learning.

Conclusion

Based on the results of research and discussion, it can be concluded that the statistics learning outcomes of students who are taught face-to-face directly or offline in the Education Study program of Physical, Health and Recreation, Faculty of Teacher Training and Education, Pattimura University are significantly better than the statistics learning outcomes of students who are taught indirectly or online. Meanwhile, student statistics learning outcomes taught directly or offline were not significantly better than student statistics learning outcomes taught using mixed methods or blended learning and also student statistics learning outcomes through the application of learning carried out using mixed learning were not significantly better than statistics learning outcomes of students taught online. The results showed that statistics learning through face-to-face or offline is still superior and better than the application of indirect or online or mixed learning. Blended learning and online learning models can be used as a solution or alternative when face-to-face learning cannot be done normally to support the learning process to achieve the goals that have been set.

Recommendation

It is recommended for lecturers or lecturers in the department of education, the Faculty of Teacher Training and Education in general and more specifically in the Physical Education study program to be able to carry out offline learning and also be able to conduct a research on online learning methods and blended learning more broadly and more focused because this learning is being promoted in learning and needs to be empirically proven in a larger population about the effectiveness of online learning methods.

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