The impact of online learning on basketball courses: A true experimental design study in sports students

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Abstract

This study explores the implementation of online learning for basketball courses at STKIP PGRI Bangkalan compared to offline basketball courses. Employing a true experimental design with a posttest-only control setup, the research gathers data through pretest and posttest scores. The study ensures validity through expert validation and assesses reliability using product-moment correlation. Normality tests are performed with the one-sample Kolmogorov-Smirnov test, while differences are evaluated using an independent sample t-test. This research reveals significant differences between online and offline learning environments. The analysis highlights a decrease in performance during online courses with a mean difference of 9.29870, underscoring the challenges faced by students in adapting to online learning platforms. The study contributes valuable insights into the effectiveness of online learning in physical education, providing a basis for future educational strategies and interventions.

Keywords: Education, online course, digital education, sport student.

Authors contribution: a – Preparing concepts; b – Formulating methods; c – Conducting research; d – Processing results; e – Interpretation and conclusions; f - Editing the final version.

INTRODUCTION

Online learning is an educational system that does not involve in-person interactions but relies on a digital platform to facilitate teaching and learning, even remotely (Handarini & Wulandari, 2020). Online learning systems are carried out without face-to-face meetings and can be accessed through platforms on electronic-based devices such as computers, smartphones, laptops, and tablets. Implementing online learning systems is a strategy to address challenges and enhance students' access to educational materials (Anugrahana, 2020). From the digitalization of

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education, students accessed learning materials through the provided platform, which made it easier for them to carry out online learning. Online learning systems optimize interactions between teachers and students through discussion forums available on the platform (Riyanda et al., 2020). The online learning system makes it easier for students and educators to deliver material and engage in discussions with students. Thus, the responsibility of a teacher or lecturer in educating students, even though it is done through a network, can be fulfilled and conveyed effectively. Online learning modality has helped them gain self-development, where they discover some characteristics that can be used positively in the future (Belleza et al., 2024). However, it should also be noted that in several challenges were found in implementing online physical education learning, which undoubtedly poses a challenge for academics to investigate further. Students in physical education face challenges in online learning, including limited internet quota, poor service coverage, unconducive environments, and technical issues with devices (Putri, 2021).

Online learning for physical education basketball in high school was generally effective, with most students rating it positively (Ramadhani & Waluyo, 2021). This suggests that when implemented correctly, online learning platforms can support the educational process by providing flexibility and accessibility, which are particularly beneficial in situations where traditional in-person classes are not feasible. However, the effectiveness of online learning in sports education, particularly in skill-intensive activities like basketball, remains a topic of debate. Another research about online basketball learning with the controlled groups concluded that both online and offline basketball learning significantly improved, but the offline group significantly improved (Ahmed et al., 2023). Online learning through social media can improve basketball skills, in-person learning is significantly more effective (Jin & Zou, 2021). These findings suggest that while online methods can be a valuable supplement, traditional, in-person training is still crucial for optimal learning outcomes in basketball education. This finding underscores a key limitation of online

learning in physical education: the difficulty of replicating the hands-on, immediate feedback that is so crucial in mastering physical skills.

There are several obstacles to the implementation of practical learning through online learning. The collection of assignments in the form of videos or photos only makes it difficult for teachers, causing fatigue when correcting students' assignments (Prawanti & Sumarni, 2020). One of the obstacles in implementing practical learning through online learning is the collection of practical assignments that can only be submitted in the form of videos or photos. As a result, teachers may need to replace practical activities with activities that are oriented toward student activities at home (Hutami, 2021). Online learning can be an alternative solution for digital education transformation, even in practical courses, enabling learning to continue, but teachers cannot have full control over students, especially during video conferencing sessions. Students sometimes prefer to turn off their cameras, and when the teacher asks about attendance or to discuss subject matter, students may be slow to respond (Wahyuningsih, 2021). These constraints greatly affect the implementation of practical learning since teachers are unable to closely monitor students when they are practicing at home due to network-related slow-motion issues, sudden interruptions in video conferencing, among other factors.

E-learning in this college platform is a software-based electronic learning system. To optimize the platform that has been running since 2019, technical implementation was done continuously as it is expected that this platform can provide better benefits for users and the future development of online physical education learning. It was utilized by STKIP PGRI Bangkalan as an online learning. LMS stands for Learning Management System, a digital system used to manage and organize learning materials and activities (Alfina, 2020). In student sports learning, it is concluded that within students' experiences towards instruction, physical education instructors utilized digital platforms to discuss lessons and gave considerable time for the students to finish and submit all the assigned tasks (Mendoza, 2023). E-learning enables teachers to track student engagement

in assignments, discussion forums, and other activities, allowing for character assessment (Wibowo et al., 2015). This is similar to offline sports learning, but some of the learning features are referred to differently, as well as the implementation techniques. Online learning can help teachers monitor student activities remotely through assignments, discussions, and question-and-answer sessions. This way, teachers can describe students using the Learning Management System (LMS). Online learning is a development of distance learning or remote learning systems (Muhammad, 2017). In contrast, this research specifically targets college students in higher education, examining the effects of online versus offline learning environments for basketball courses. This unique focus on higher education and the specific subject of basketball distinguishes it from prior studies, providing insights into the challenges and performance differences in online physical education at the tertiary level.

METHOD

This research study is a true experimental design, with the chosen design being a post-test-only control design. This design was selected to enable the investigation of all possible causal relationships that may occur with this design (Pranata et al., 2022). The main feature of a true experimental design is that the sample used for the experiment and the control group are randomly selected from a certain population (Rifqi et al., 2022). This type of true experimental design research has main characteristics, such as the use of a randomly selected sample for the experiment and a control group from the selected population.

This research uses two separate groups of 23 student samples who participate in offline lecture courses and 23 different student samples who participate in online lecture courses. Purposive sampling is considered the most appropriate technique for this research. The principles of effectiveness and efficiency determine the use of these samples. Students who serve as samples in the online learning group are from the campus that developed the online learning platform. Meanwhile, the student samples in the offline learning group are from the same campus but still need to implement online

learning in the relevant courses. The use of these samples is determined by the principles of effectiveness and efficiency. Students who serve as samples in the online learning group are from the campus that developed the online learning platform. Meanwhile, the student samples in the offline learning group are from the same campus but have not yet implemented online learning in the relevant courses.

The RPS is used to fulfill or achieve the learning objectives emphasized in the course. Semester Learning Plans are prepared with important details from courses, such as descriptions, objectives, materials, strategies, references, assignments, assessment benchmarks, and schedules. The expert validators for this research are two senior faculty members from the Physical Education study program at STKIP PGRI Bangkalan. They hold the academic rank of Assistant Professor and are certified as professional educators by the Ministry of Education. The instrument validation test uses expert validation, which is tested for validation scores based on validation criteria. In research, reliability pertains to how consistently a measurement method produces stable and consistent results when applied repeatedly to subjects under the same conditions (Sanaky, 2021). The Pearson product-moment correlation analysis technique is a parametric statistical technique that utilizes interval and ratio data with specific requirements (Purba & Purba, 2022).

Table 1. Expert Validation Assessment Instrument

No.	Indicators for assessment of learning in basketball course
1	Compatibility of attendance values with academic guidelines
2	Conformity of attendance records with real conditions
3	The suitability of the questions in the quiz with the material studied at each meeting
4	Appropriateness of the difficulty level of questions for students in the given quizzes
5	Compatibility of tasks with the material studied at each meeting
6	Appropriate level of task difficulty for students
7	Conformity of the contents of the questions in UTS with the material studied 1-7
8	Appropriateness of the level of difficulty of questions for students in the Mid Semester Course Final Assignment
9	Compatibility of tasks with material learned at all meetings
10	Appropriateness of the level of difficulty of the final coursework for students
11	Appropriateness of the contents of the questions in UAS with the material studied 1-15
12	Appropriateness level of questions difficulty for in the Final Semester Examination
13	Conformity of the formulation of the final grade of the course with academic guidelines
14	Suitability of the final grade with student achievements on each indicator

The validity criteria used to determine the validity of the learning outcomes assessment instrument include factors such as clarity of language, relevance to the learning objectives, and alignment with the overall curriculum. The experts involved in the validation process were carefully selected based on their expertise in the subject matter and their experience in the field. Considering these factors, the researchers were able to make informed decisions about the validity assessment instrument and ensure that the data collected was reliable and accurate.

Table 2. Criteria for validation

Percentage	Criteria
76 – 100	Valid
56 – 75	Valid Enough
40 – 55	Less Valid
0 – 39	Invalid

(Arikunto, 2016)

The normality test used a one-sample Kolmogorov-Smirnov (KS) test. Several normality test methods exist, such as observing the data spread on diagonal sources as a Normal P-P Plot of regression standardized residuals or using the One Sample KS test (Tala & Karamory, 2017). The normality test is aimed at testing whether the residual values are normally distributed or not, and this can be done through the one-sample KS non-parametric statistical test (Nurcahyo & Riskayanto, 2018). This test helps determine whether the sample scores can be attributed to a population with a particular distribution (Nuryadi et al., 2017).

This research employed an independent sample t-test to assess whether a statistically significant distinction existed between the two non-matched groups. The independent (unpaired) two-sample t-test is a method for checking the similarity of the means from two independent populations when the researcher has no information about the variance of the population (Ridayati, 2017). In research, the independent sample t-test is a statistical method used to compare the means of two distinct and unrelated groups. It assesses whether there is a significant difference between the group averages, considering their independence (Palupi et al., 2021). The difference test using the Independent sample t-test is a type of parametric inferential statistics, also known as a comparison test. In research, the independent-samples t-test is a statistical method used to compare the means of two distinct groups of cases. These cases (data points) are randomly selected and have undergone a single measurement process. The test assesses whether there is a significant difference between the average values of the two groups, considering their independence (Muhid, 2019).

RESULT

The implementation phase of the research begins with analyzing the instruments used to collect data by testing their validity and reliability. Two sports learning experts were involved in this study. These experts had competence in the field of study and held the academic position of lecturer. The validity test used in this study was an expert validation test. The results can be seen in Table 3 below.

Table 3. Expert validation results

No	Indicators for assessment of learning in basketball course	Validator	
		1	2
1	Compatibility of attendance values with academic guidelines	5	5
2	Conformity of attendance records with real conditions	4	3
3	The suitability of the questions in the quiz with the material studied at each meeting	5	5
4	Appropriateness of the difficulty level of questions for students in the given quizzes	4	3
5	Compatibility of tasks with the material studied at each meeting	4	4
6	Appropriate level of task difficulty for students	4	3
7	Conformity of the contents of the questions in UTS with the material studied 1-7	4	4
8	Appropriateness of the level of difficulty of questions for students in the Mid Semester	4	4
Course Final Assignment			
9	Compatibility of tasks with material learned at all meetings	4	3
10	Appropriateness of the level of difficulty of the final coursework for students	4	4
11	Appropriateness of the contents of the questions in UAS with the material studied 1-15	3	3
12	Appropriateness level of questions difficulty for in the Final Semester Examination	4	3
13	Conformity of the formulation of the final grade of the course with academic guidelines	5	5
14	Suitability of the final grade with student achievements on each indicator	4	4
The Average Number of Results (%)		**83%**	**76%**

Based on the table of expert validation assessment results above, the mean is used to make decisions about the instrument's validity. In this validity and reliability test, the validators observe the learning process in different groups that have tried out the learning instruments for this study. The validation scores given by the validators during the observation become the data for the validity test, and the data from the groups that tried out the learning process become the data for the reliability test of the learning instruments.

Based on the mentioned reference validation criteria, the instruments used for data collection are deemed valid, given the average validation test result of 83% from expert validation assessment 1 and 76% from expert validation assessment 2. Nevertheless, it is crucial to emphasize that ensuring the reliability of the instruments is still necessary despite their validity based on the expert validation assessments. To measure the consistency and stability of the instruments in measuring the variables of interest, we conduct a reliability test. The reliability test result will be discussed in the following section.

Table 4. Product moment correlation reliability test results

		LectureOffline	LectureOnline
Lecture_Offline	Pearson Correlation	1	.226
	Sig. (2-tailed)		.301
	N	20	20
Lecture_Online	Pearson Correlation	.226	1
	Sig. (2-tailed)	.301	
	N	20	20

The significance value between the offline lecture group and the online lecture group is 0.301, indicating that there is no relationship or correlation between the two sample groups in basketball lectures. Since the significance value is greater than 0.05, there is no correlation between the two lecture groups. The correlation between variable X and variable Y is weak, with a positive form of relationship.

Table 5. Results of one-sample ks test for normality

		Unstandardized Residual
N		23
Normal Parameters^{,b}	Mean	.0000000
	SD	11.09017254
Most Extreme Differences	Absolute	.240
	Positive	.156
	Negative	-.240
Test Statistic		.240
Asymp. Sig. (2-tailed)		.001[c]

According to the outcomes of the normality test using the one-sample Kolmogorov-Smirnov test, it can be inferred that the residual values do not follow a normal distribution. This conclusion is based on the significance value of 0.001, which is less than the threshold of 0.05. Consequently, modifications were made to the model to ensure that the significance value exceeds 0.05. With the results of the normality test showing that research data was not normally distributed, the normality test proceeds to the next stage by using P values that are appropriate for the research data, which is below 30 samples that cannot meet the requirements in the KS normality test.

Table 6. Kolmogorov-Smirnov one-sample normality test results (test exact p values)

		Unstandardized Residual
N		23
Normal Parameters,b	Mean	.0000000
	SD	11.09017254
Most Extreme Differences	Absolute	.240
	Positive	.156
	Negative	-.240
Test Statistic		.240
Asymp. Sig. (2-tailed)		.001c
Exact Sig. (2-tailed)		.118
Point Probability		.000

Based on the Exact test using Exact P Values, the significance value increased by 0.118 and exceeded 0.05. Therefore, the data from the two sample groups of offline and online basketball lectures are normally distributed. The Exact P Values were used because the data is limited in size. Without using Exact P Values, the data would not be normally distributed.

Table 7. Independent sample t-test difference results

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	MD	SED
Offline_and_Online_ Learning_Outcomes	Equal variances assumed	1.870	.178	3.573	44	.001	9.29870	2.60250
	Equal variances are not assumed.			3.573	30.546	.001	9.29870	2.60250

Based on the outcomes of the independent sample t-test, it is evident that the p-value of 0.001 is less than the significance level of 0.05. Consequently, a significant difference exists between the results of the offline lecture group and the online lecture group. As a result, we reject the null hypothesis (H0) and accept the alternative hypothesis (Ha), indicating that there is a distinct treatment effect between the two groups in basketball courses. This statement can be seen from the test results which are based on a P value of 0.001 <0.05 so that H_0 is rejected, then decision making can also be seen from t count 3.573 > 2.015 so that H_0 is rejected. From the table above, there is a noticeable difference in the mean score of 9.29870 with a positive value, indicating that the average achievement of students

decreased in online learning compared to the previous group that participated in offline learning.

Table 8. Results of the average percentage of offline and online lecture groups

Average Percentage of Learning Outcomes in Basketball Courses		
Offline	Online	Percentage
82,13	72,83	-11,32%

Based on the percentage results from the diagram above, regarding the average percentage increase of all samples, which includes the offline lecture group consisting of 18 men and 5 women, totaling 23 students or samples, and the online lecture group consisting of 20 men and 3 women, totaling 23 students. The total number of the two lecture groups in this study is 46. From the percentage diagram above, it can be observed that there was a decrease in the average grade that occurred from the entire offline lecture group sample and the entire online lecture group sample. The average percentage of all offline lecture groups from 23 samples has an average value of 82.13, and the percentage is 53%, while for the online lecture group, the average of 23 samples has an average value of 72.83, and the percentage is 47%. So, when compared to the average value of the two lecture groups, it produces a percentage of -11.32% or 0%, indicating a decrease.

DISCUSSION

This study found that online learning is less effective than offline learning for practical basketball courses, with students showing significantly lower performance online. Another research also concludes that there is a statistically significant difference in the learning outcomes between offline and online physical education classes, with offline learning being more effective (Ariyanto et al., 2022). Offline physical education classes scored statistically higher than online physical education classes (Yang & Choi, 2022). The offline group outperformed the online group significantly, indicating that students were more engaged and better able to learn in a traditional setting. However, previous research has generally shown mixed results. Some studies highlight that online learning can be effective for

theoretical aspects but needs help with practical subjects that require physical presence and hands-on practice. Online physical education programs significantly improved physical activity levels among students. This includes increased step counts and overall physical activity measured in MET minutes per week (ÜNLÜ, 2022). While the online mode may limit the development of movement capability, it provides new opportunities for focused, self-paced learning. Therefore, the effectiveness of physical education in an online environment depends on balancing these gains and losses (Nyberg et al., 2024). Practical challenges such as lack of supervision, immediate feedback, and technical issues were significant barriers in the online learning environment. Emphasizes the need for tailored online learning approaches for practical courses, suggesting that innovative methods and technologies could help bridge the gap. One of the main issues identified in the study that requires further research is the difficulty in maintaining engagement and ensuring active participation in online settings.

CONCLUSION

The results indicate that implementing online learning by utilizing the online learning platform for basketball courses in the early stages of its implementation still needs to be improved. The results of the different tests conducted also suggest a decrease in the average score of the online group. However, further investigation is needed to determine the factors that significantly influenced this decline in learning outcomes. This research provides benefits for teachers to utilize the online learning system during critical situations, such as a pandemic, where the LMS makes teachers deliver subject matter to students more easily and remotely on the network. For future research, it is also necessary to investigate whether online learning is suitable for practical learning, whether lecturers need to be adequately prepared to implement it, or whether students are not ready for practical learning online.

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