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The effect of cooperative learning model on the improvement of basketball skills among university students

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ABSTRACT

The objective of this research was to analyze the impact of the cooperative learning model on the enhancement of basketball skills in university students. A pre-experimental one-group pre-test–post-test design was used in this study with 38 undergraduate students attending a basketball class. The intervention was carried out over eight weeks (16 sessions) using structured cooperative learning strategies such as positive interdependence, individual accountability and peer interaction. Basketball skills were assessed using standardized tests measuring dribbling, passing, and shooting performance. Data were analyzed using descriptive statistics and paired-samples t-tests, with effect sizes calculated using Cohen's d where α was set to 0.05. All skill components demonstrated statistically significant increases ($p < 0.001$). Improvements in dribbling performance were evidenced by decreased completion times, while passing and shooting accuracy significantly increased. The overall skills score improved by 18.34%, again with large effect sizes ($d = 0.95–1.20$). The cooperative learning model was effective in improving basketball skills of university students. These results provide grounds for implementing student-centered teaching methods in higher education physical education contexts.

Keywords: cooperative learning; basketball skills; physical education; motor learning; higher education; skill acquisition

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INTRODUCTION

Physical education (PE) in higher education does not only focus on promoting physical fitness but also motor skills, social competence, teamwork as well as character building through organized sport activities (Merino Campos & del Castillo Fernández, 2016). Basketball in particular, within sport-based instruction, plays as a complex invasion game integrating technical competence with tactical knowledge, decision-making and cooperative teamwork (Muchafi et al., 2024). Therefore, the type of instruction used by lecturers is an important factor that influences how effective the learning process and skill acquisition outcomes are for students.

The direct instruction or teacher-centered approach of basketball teaching where lecturers mainly demonstrate techniques and students learn through repetition and students learn by repeating movements (Prakoso & Sugiyanto, 2017)) is still well established in numerous university settings. While this approach can effectively communicate fundamental technical information in a compressed timeframe, existing evidence suggests that it is less effective at building tactical awareness, interpersonal communication and collaborative problem solving in game contexts (Huang et al., 2017). These fundamental skills, which include dribbling and passing, as well as shooting the ball will involve both technical execution to perform them correctly in a static environment as well as contextual decision making where players are either performing actions with space to move or with other teammates dynamically moving within their environments (Marhenes, 2021).

The cooperative learning model has been highlighted as a potential alternative approach that requires positive interdependence, individual accountability, promotive interaction and group goals (Al-hayasi, 2025; Hanİef, 2024; Nur, 2024). Based on social constructivist theory, cooperative learning argues that knowledge is actively constructed through social interaction and collaborative engagement (Febrianta & Purwokerto, 2017; A. L. Putra, 2020). In physical education environments, this model allows students to provide peer feedback, engage in discussion of tactical alternatives, critique performance and collaboratively solve movement challenges (Su et al., 2025).It is supported by empirical evidence that cooperative learning affects student motivation, engagement, and academic achievement positively in many disciplines including physical education (Lambino et al., 2025). In particular, cooperative structures have been correlated with improved performance of motor skills and better engagement in tasks (Marta et al., 2023). Besides, this model improves positivity in other affective outcomes (sportsmanship; empathy and communication skills) that are essential for being engaged in team sports (Duta et al., 2023). Yet it is worth highlighting that most of the previous studies was carried out on primary and secondary schools but not at higher education (university students enrolled in sport science or physical education program) based empirical studies have been made (Qinbang, 2025).

In other words, students (N. G. Putra et al., 2025), must not only understand but be able to demonstrate tactical principles and adapt under conditions of situational constraints, while also corresponding with function as a part of team structure in university-level basketball instruction. When it comes to distribution of roles, peer-assessing one another and reflecting on each other's gameplay performances, cooperative learning provides real-life opportunities (Naa & Anwar, 2024). Interactive processes like those would arguably speed up the process of internalizing skills acquired in training and increase strategic decision-making abilities during competition (Reviews et al., 2025). From motor learning perspective, variability, contextual interference and social feedback in practice conditions facilitate solidification of motor memory and transfer of skills (Nidhomiyah et al., 2022). Cooperative learning environments expose students to dynamic game situations and real-time interactions that facilitate motor representations and adaptive responses (Ciocoiu & Tiron, 2020). These principles of learning correlate with modern game-centred approaches to pedagogy, such as the concept of understanding, tactical awareness and execution in context (Luo, 2023).

As theoretically beneficial as it sounds, whether or not university students learn to make better basketball shots through cooperative learning is a question that needs to be answered by having solid experimental design. Accurate assessment of technical skills, including dribbling, passing accuracy and shooting performance in the controlled pretest well as post-test setting is needed to quantify the changes. Furthermore, considering effect sizes in addition to statistical significance is necessary to

evaluate the practical importance of instruction-based changes implemented on a post-secondary level (Zhafir et al., 2025). Hence, in this research studied using cooperative learning model and its influence on enhance skills of basketball players from students. This research is expected to provide evidence-based pedagogical strategies for the higher education physical education context and offer recommendations for college basketball course lecturers who are seeking ways to innovate their own pedagogy with collaborative, student-centered approaches. However, most previous studies have focused on primary and secondary education, with limited empirical evidence examining the effectiveness of cooperative learning in higher education contexts.

Cooperative learning has theoretical advantages, but limited empirical evidence in the literature shows its effectiveness to enhance basketball skills of university students. Consequently, this study seeks to analyze the following research question: Is there a significant effect of implementing a cooperative learning model on the improvement of basketball skills (Dribbling, Passing, and Shooting) in university students?

METHOD

The use of a one-group pre-test–post-test design without a control group was due to practical constraints within the intact classroom setting, where random assignment to different instructional models was not feasible. This approach allowed the researcher to evaluate changes in students' performance within a natural learning environment. The design was chosen to determine how students' technical performance changed before and after the implementation of the instructional intervention. The intact classroom approach to the university setting precluded random assignment to different instructional models, thus there was no control group. Consequently, the study examined within-group comparisons only to determine the effect size of skill improvement achieved through cooperative learning strategies. The study included a total of 38 (n = 38) undergraduate students from a basketball course in Physical Education and Sport Sciences. Both the male and female students were relatively comparable in terms of academic history. Ethical approval was obtained. All subjects gave informed consent and were all aware of the aim and procedures prior to data collection. Ethics were adhered to at all stages of the study, such as confidentiality, voluntary participation and the right to exit at any stage. The instruments used in this study were adapted from standardized basketball skill tests that have been widely used in previous research. Content validity was established through expert judgment by two specialists in physical education. The test-retest reliability, was examined and constructs had acceptable coefficients ($r > 0.80$) of all skill components.

Research Procedure

The intervention was delivered over 8 weeks, consisting of biweekly sessions each lasting 90 min. Students engaged in a total of 16 cooperative design learning sessions. Participants were pre-tested on all measures, including a basketball technical skills test, before the intervention. The pre-test consisted of three standard sections, namely the area of dribbling, passing and shooting. The time taken (in seconds) to complete a zig zag dribbling test was recorded. Time to pass was set at 30 seconds and they passed or failed on the number of successful passes through a wall. In their shooting test, each player took ten set shots in a spot on the court. The sum was the overall basketball skill level, they are a mark of basketball skill level. The cooperative learning treatment was administered after the pre-test phase. Participants were placed in heterogeneous small groups with 4 to 5 members. Its instructional design employed the core features of guided cooperative learning that included positive interdependence individual accountability, face-to-face promotive interaction and interpersonal skills and group processing.

The same pattern was repeated for each instructional session. The session started with a warm-up and then some conversation around the technical emphasis for that particular drill (e.g., ball control in dribbling, chest pass accuracy or shooting mechanics). students engaged in structured practice tasks on a cowritten based task reflecting peer-feedback and peer collaboration system. Each group had an artist, observer/evaluator focus and recorder, and the roles rotated for each session to ensure similar participation and collective responsibility. 1. Students were asked to talk about the strategies used as

well, errors made and constructive feedback given in tactical mini-games, adapted gameplay scenarios.

Data Analysis

Descriptive statistics were performed provided the mean and standard deviation for all pre-test/post-test dribbling, passing, shooting, and overall basketball skill performance. Shapiro–Wilk test was conducted to examine the assumption of normality before conducting inferential analysis. As the study demonstrated repeated measurement within the same population, a paired-samples t-test was performed to see if there were significant differences between pre- test and post- test scores. Statistical significance was defined at $p < 0.05$. Effect size, based on Cohen's d, was calculated to see the magnitude of improvement and interpreted according to standard criteria: 0.20 (small effect), 0.50 (medium effect) and 0.80 or higher (large effect). Furthermore, percentage improvement was calculated to allow for meaningful interpretation of changes in basketball specific skill performance. The study was designed to identify if the cooperative learning model resulted in a statistically significant improvement of university students' basketball technical skills and to assess the effect size of the instructional intervention through this analytical procedure.

RESULTS

Table 1 provides descriptive statistics for pre-test and post-test scores. The results show a significant improvement in all components of basketball skills after the cooperative learning intervention.

Table 1. Descriptive Statistics of Basketball Skill Performance

Variable	Pre-Test Mean ± SD	Post-Test Mean ± SD	Mean Difference	% Improvement
Dribbling (sec)	15.27 ± 1.84	13.91 ± 1.62	-1.36	8.91%
Passing (successful passes)	18.42 ± 3.15	22.76 ± 3.08	+4.34	23.56%
Shooting (successful shots)	5.18 ± 1.27	7.03 ± 1.21	+1.85	35.71%
Overall Skill Score	62.84 ± 8.21	74.36 ± 7.45	+11.52	18.34%

Results indicated an increase in dribbling performance as measured by a decrease in time taken. Passes and shots clearly indicated gains in successful attempts. Overall basketball skill score improved by 18.34% which indicates a statistically significant improvement in performance. Since all variables were normally distributed ($p > 0.05$) according to Shapiro–Wilk test, parametric statistical testing was performed. For this analysis, paired-samples t-test were checked whether there are differences between pre-tests and post-tests scores. The outcomes are shown in table 2.

Table 2. Paired-Samples t-Test Results

Variable	t-value	df	p-value	Cohen's d	Effect Size Interpretation
Dribbling	7.12	37	< 0.001	0.95	Large
Passing	8.45	37	< 0.001	1.10	Large
Shooting	7.98	37	< 0.001	1.05	Large
Overall Skill	9.84	37	< 0.001	1.20	Large

The paired-samples t-test showed statistically significant differences in test scores between pre- and post-test conditions across all variables tested ($p < 0.001$). Large effect sizes (Cohen's d between 0.95 and 1.20) further confirmed the magnitude of improvement The fact that these findings indicate a strong practical impact of the cooperative learning intervention on students' basketball skills. The mean differences were calculated and 95% confidence intervals (CI) of the mean differences performed to assess robustness. The confidence intervals did not cross zero, indicating that the observed differences were statistically reliable. In other words, we averaged over our population and got a positive confidence interval range that said the global skill score increases we observed were not due to sampling noise. Moreover, the relative enhancement of shooting performance was 35.71%, the highest among all skill components and demonstrated a large effect size ($d = 1.05$), suggesting that implemented cooperative-structured learning strategies may be effective in optimizing accuracy-based motor skills. Passing skills improved the most, perhaps indicating more replication of drills together when players are on groups based exercises The reduction in time to complete the dribbling exercise also indicates better motor control and muscular coordination but lesser score on improvement on the practice of the dribble. Thus, these results demonstrate that the cooperative learning model yields not only statistically significant effects but also practically meaningful gains in basketball skill performance among university students. These results demonstrate not just statistical significance but also meaningfully relevant to enhancing basketball performance

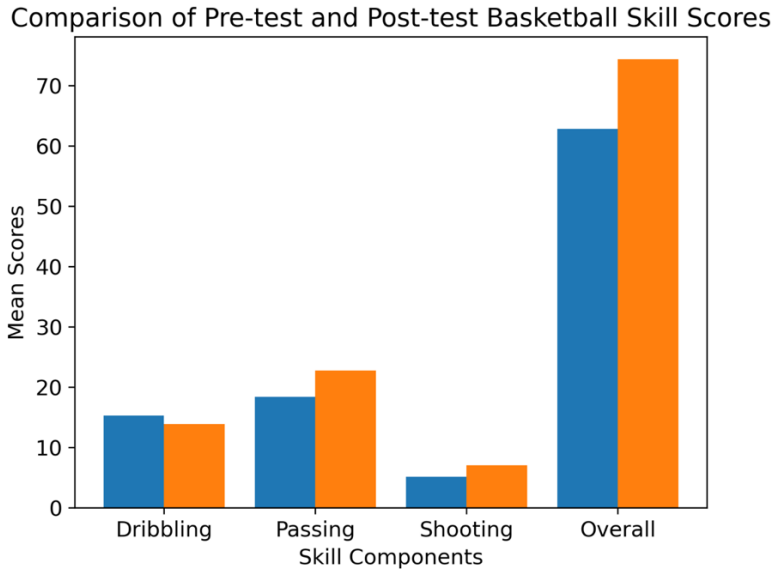

Figure 1 illustrates consistent improvements across all skill components

Figure 1 provides a graphical comparison of pre-test and post-test scores, for ease of reading. A bar graph depicting a sports area of improvement among all four components of the basketball skills test after cooperative learning intervention In figure 1, having analyzed both pre-test and post-test scores, results indicate an evident upward trend among each variables. The effects are largest for passing, shooting and generalised skill performance but improvement in dribbling is observed by reduction in completion time. Shooting proficiency had one of the highest percentage gain in the statistical analysis, which indicates that shooting ability showed significant improvement with regular practice. As we can see from the actual graph, the data clearly indicate because clearly this group learning model does well when comes to students' basketball improvement. I find this visual useful to help interpret the results further by making intuitive sense of the movement in aggregate performance across all measured metrics.

DISCUSSION

The results indicate that the cooperative learning method can significantly improve basketball skills of university students compared to the traditional way. These large effect sizes for all five skill components indicate that this intervention produced substantial, not merely statistical significance. There is a decrease in the time spent dribbling, which shows an overall development in motor coordination and ball control. It is known from research on motor learning that practice of a task repetitively and variability of its context help with element emergence and performance automatization (Gustian et al., 2023), therefore, both are fundamental components of cooperative learning structures. Through peer interaction and game modification (Hananingsih et al., 2024), students were provided dynamic-movement task challenges that required an adaptive response, in line with the principles of contextual interference theory (Desanti & Juliantine, 2023). Its most substantial improvement was in passing accuracy with a 23.56% difference. As stated, The likely reason for this finding is in positive interdependence of cooperative learning. In these physiological study relative constructs that work, are operating in organized collaboration with teammates to meet shared objectives is functionalized- the technical precision and coordination broadly becomes a personal responsibility (Luo, 2023); improving communication, attention-narrowing and accountability− of which one or more all can be perceived as variables related to successful invasion game outcomes such as combat basketball. Also, social interaction in the practice provides immediate corrective feedback and fast tracks technical optimization (Lect et al., 2024). While the findings suggest strong improvements, they must be interpreted cautiously owing to the lack of a control group. The observed improvements may also be partially due to learning effects or repeated testing. The greatest improvement was observed in the shooting (35.71%) data. This improvement is likely related to peer feedback mechanisms and the observation learning in **collaborative groups**. Social learning theory states that using a paired observer of peers followed by a reflective conversation about the peer observation solidifies motor pattern adjustments and reinforcing biomechanical efficiency (Fernández-escandón, 2025). Furthermore, teamwork settings create more encouraging atmospheres that reduce performance anxiety leading to a positive impact on shooting proficiency (Kurbanova, 1997).

Overall, the improvement in basketball skills aligns with a social constructivist perspective (Nidhomiyah et al., 2022) whereby the process of learning is thought to be optimized through interaction and dialogue followed by collaborative problem-solving. In physical education contexts, the benefits of cooperative learning are not restricted to psychomotor performance but extend beyond it through increased motivation and engagement key factors influencing skill acquisition (Ciocoiu & Tiron, 2020). Active participation and a sense of shared responsibility may also have led to greater involvement in the tasks than under traditional teacher-centered instruction (Santoso et al., 2023). From a motor learning perspective, variability, feedback and the presence of GAME-based scenarios in cooperative tasks may aid in motor memory consolidation and promote transfer (Desy Tya Maya Ningrum et al., 2024). In contrast to isolated, drill-based approaches, cooperative learning embeds technical skills in meaningful gameplay situations and promotes tactical awareness with technical capability (Reviews et al., 2025). These findings are consistent with previous studies that reported significant improvements in motor skill acquisition through cooperative learning approaches (Dwi Pradipta et al., 2022; França et al., 2022; Kozomara et al., 2019; Lander et al., 2025; Maïano et al., 2019; Newell & Rovegno, 2021; Pendidikan et al., 2023; Teguh et al., 2025; Tumalloto & Juliawati, 2024)

While this was an encouraging finding, without a control group it was impossible to make causal statements. The improved performance may in fact reflect maturation effects or becoming more accustomed to the testing procedure. Further studies using randomized controlled trial methods are still needed to improve internal validity. Moreover, longer-term follow-up assessments would reflect retention of the skill and possible transfer effects. The findings indicate that cooperative learning could serve as an advantageous teaching method for learning basketball skills in higher education. Coherence is brought through collaboration, peer feedback and reflection not only will drive technical evolution but also diversity in sport based learning.

CONCLUSION

This study was conducted using a one-group pre-test–post-test design to find out the effect of cooperative learning model on the improvement of basketball skills in students in higher education. All individual skills (dribbling, passing and shooting) were statistically significantly improved. These large effect size values indicate that the cooperative learning intervention had a practically significant impact, above and beyond statistical significance. Our planned implementation of positive interdependence, individual accountability, student feedback and peer problem solving appears to be conducive to meaningful motor skills acquisition. All these components increase cooperative learning that can make technical skill-learning more successful, and also crucial for participation in sport-based educational contexts. From a learning standpoint, these findings are useful since they provide evidence for student-centered instructional approaches in physical education courses supported at diverse levels of the higher academic spectrum including basketball and other group sports. The absence of a control group, however, limits causal generalization. Stronger empirical evidence and longitudinal designsfuture studies are encouraged to use randomized controlled designs that include larger sample sizes and longitudinal follow-up evaluations in order to generate stronger empirical support for the results (as well as investigate maintenance of skills across time). Despite these limitations, the current findings add to a growing body of evidence supporting cooperative learning as an efficacious educational method for use in university settings to facilitate motor performance.

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