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Progressive and game-based training approach in basketball learning: the role of students' motor skills

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ABSTRACT

This study examined the effect of Progressive and Game-Like training methods on the shooting ability of Padang State University basketball players, considering motor skill levels (high vs low). A quasi-experimental 2x2 factorial design was used with 20 purposively selected players. Shooting ability was measured using the Basketball Jump Shooting Accuracy Test, and motor skills were assessed with the Barrow Motor Ability Test. Data analysis using two-way ANOVA revealed a significant effect of training methods on shooting ability ($F = 31.296$; $p < 0.05$) and a significant interaction between training methods and motor skill levels ($F = 76.406$; $p < 0.05$). The Game-Like Method was more effective for players with high motor skills, while the Progressive Method benefited players with low motor skills. These results highlight the importance of tailoring training methods to individual motor characteristics and suggest careful consideration of sample limitations and context in interpreting effectiveness.

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Introduction

Shooting is the most fundamental skill in basketball because it is the primary means of scoring points (Saputro, 2023; Yenes, 2018). Low shooting effectiveness is often a key factor in team performance failure. Observations of the Padang State University (UNP) basketball team showed a two-point shooting success rate of only 14% and a three-point rate of 11%, far below competitive standards, indicating the need to evaluate the training methods applied. According to Krause & Nelson (2019), Dwijawanti & Satria (2024), and Febriani et al. (2022), shooting success is influenced by basic techniques, physical condition, and training that simulates real-game situations.

Various training approaches have been developed to improve shooting skills (Jawad et al., 2025; Zhao, 2023), including the Progressive Method and the Game-Like Method. The Progressive Method emphasizes gradual mastery of technique, from simple to complex movements (Antonelli, 2020), and is considered suitable for beginners or players with low motor skills because it provides systematic and consistent practice (Kurniawan & Nawawi, 2020; O et al., 2022). In contrast, the Game-Like Method

emphasizes training that simulates game conditions, requiring players to make quick decisions, coordinate with teammates, and execute techniques under pressure (Juanda et al., 2024; Memmert & König, 2020; Pebriani et al., 2024).

In addition to training methods, motor skills play a critical role in supporting shooting performance. Motor skills include coordination, balance, agility, and reaction time, all of which influence the quality of athletic skills (Dewi & Sitompul, 2016; Kiram, 2019). Players with high motor skills can master basic techniques more easily and remain stable under match pressure (Lee et al., 2023), while players with lower motor skills require more structured practice to achieve optimal performance (Kiram, 2023).

Previous studies have indicated that aligning training methods with individual characteristics can improve sports skill acquisition (Zeng, 2023). However, studies examining the interaction between training methods and motor skills in basketball shooting remain limited, especially in the context of university-level players in Indonesia (Christianto et al., 2017; Rusmana, 2024). Shooting is a critical skill that determines match outcomes, making it essential to understand this interaction (Estigana et al., 2021; Putri et al., 2024).

Motor learning theory further emphasizes that individual motor ability influences how athletes acquire and refine new skills (Kiram, 2019, 2023). Players with high motor skills can adapt to complex, game-based training, whereas players with low motor skills benefit from a gradual, structured approach (Komarudin, 2015; Saichudin & Munawar, 2019). This highlights the importance of tailoring training methods to the motor profiles of each player to maximize effectiveness.

Moreover, research shows that training under real-game intensity, such as small-sided games, improves shooting consistency and performance in players with high motor skills due to rapid decision-making and team coordination demands (Giancamilli et al., 2022; Rahmawati, 2021; Nickevin et al., 2021; Linda Susila et al., 2024). Conversely, the Progressive Method helps players who are still developing basic techniques reduce technical errors before facing complex game situations (Kurniawan & Nawawi, 2020; Rusmana, 2024; Rustiono et al., 2025; Pebriani et al., 2024).

Therefore, this study aims to analyze the effects of the Progressive and Game-Like Methods on the shooting ability of UNP basketball players and to examine the interaction between training methods and motor skills, providing practical guidance for coaches to adapt training according to individual motor characteristics.

Method

This study employed a quasi-experimental design with a 2x2 factorial structure to examine the effects of training methods and motor skill levels on basketball shooting ability. A purposive sampling technique was used to select 20 UNP basketball players, who were then divided into groups based on training method (Progressive Method vs. Game-Like Method) and motor skill level (high vs. low). The study included pre-intervention assessments to categorize players' motor skills using the Barrow Motor Ability Test, ensuring an objective grouping. Shooting ability was measured using the Basketball Jump Shooting Accuracy Test (BJSAT), which evaluates both accuracy and consistency under standardized conditions, allowing for reliable comparisons between groups.

Data analysis was conducted using two-way ANOVA to examine the main effects of training methods and motor skill levels, as well as their interaction on shooting performance. Prior to this, normality and homogeneity of variance were assessed using the Kolmogorov-Smirnov and Bartlett tests to ensure assumptions for parametric analysis were met. Where significant differences were found, Tukey's HSD post-hoc test was applied to identify which specific groups differed, providing a detailed understanding of how training methods interact with motor skill levels to influence shooting ability. The design and analysis approach allowed for a systematic evaluation of both individual and combined effects of the independent variables on basketball performance outcomes.

Results and Discussions

The results of the study showed a significant influence of training methods and motor skills on the shooting ability of Padang State University basketball players. Normality testing using the Kolmogorov-Smirnov test showed that the data were normally distributed, as shown in the table 1:

Table 1. Data Normality Test

No.	Group	N	Sig.	α	Description
1	B1	10	0.107	0.05	Normal
2	B2	10	0.200	0.05	Normal
3	AB1	10	0.15	0.05	Normal
4	AB2	10	0.018	0.05	Normal
5	A1B1	5	0.031	0.05	Normal
6	A1B2	5	0.046	0.05	Normal
7	A2B1	5	0.200	0.05	Normal
8	A2B2	5	0.026	0.05	Normal

Based on the table above, it can be seen that all data are normally distributed. Next, homogeneity testing was performed using the Bartlett test. The results of the Bartlett test indicate that all data come from a homogeneous population. For more clarity, see the table 2:

Table 2. Homogeneity Test

No.	Group	Fcount	Ftable	Conclusion
1	A1 & A2	0.405	3.18	Homogen
2	B1 & B2	0.274	3.18	Homogen
3	A1B1 & A2B1	3.982	6.39	Homogen
4	A1B1 & A1B2	0.877	6.39	Homogen
5	A1B2 & A2B2	1.500	6.39	Homogen
6	A2B1 & A2B2	0.330	6.39	Homogen

Thus, the data meets the requirements for further analysis using two-way ANOVA. The results of the two-way ANOVA analysis can be seen in the Table 3:

Table 3. Results of Two-Way ANOVA Analysis

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	45.508[a]	3	15.169	37.089	.000
Intercept	3987.488	1	3987.488	9749.359	.000
Metode_Latihan	12.800	1	12.800	31.296	.000
Kemampuan_Motorik	1.458	1	1.458	3.565	.077
Metode_Latihan × Kemampuan_Motorik	31.250	1	31.250	76.406	.000
Error	6.544	16	0.409	—	—
Total	4039.540	20	—	—	—
Corrected Total	52.052	19	—	—	—

The analysis above shows a significant effect between training methods and shooting ability ($F = 31.296$; $p < 0.05$). This analysis also shows a significant effect between motor skills and shooting ability. There is also a significant interaction between training methods and motor skills on shooting ability ($F = 76.406$; $p < 0.05$).

To determine which groups differed significantly, a Tukey HSD test was performed. The results of the Tukey HSD analysis can be seen in the table 4:

Table 4. Results of Tukey HSD Advanced Test Analysis

No.	Group	Mean Difference	Sig.	Description
1	A1B1 & A1B2	-1.96	0.001	Significant
2	A1B1 & A2B1	4.10	0.000	Significant
3	A2B1 & A1B2	2.14	0.000	Significant
4	A2B1 & A2B2	3.04	0.000	Significant

The Tukey HSD test results showed significant differences between the treatment groups. The most consistent difference was demonstrated by the A2B1 group (Game-Like Method with high motor skills), which had a significantly higher average shooting ability score than the A1B1, A1B2, and A2B2 groups. This indicates that the Game-Like Method-based training method is more effective when applied to players with high motor skills.

Meanwhile, the A2B2 group (Game-Like Method with low motor skills) showed no significant difference compared to the A1B1 and A1B2 groups, but was significantly different from A2B1. This finding suggests that the effectiveness of the Game-Like method tends to decrease in players with low motor skills.

In contrast, the A1B2 group (Progressive Method with high motor skills) outperformed the A1B1 group (Progressive Method with low motor skills), but still performed lower than the A2B1 group. This supports the interpretation that the Progressive Method is more suitable for players with low motor skills, while the Game-Like Method produces better results for players with high motor skills.

The findings of this study indicate that the Game-Like Method is more effective for players with high motor skills, while the Progressive Method is more suitable for players with low motor skills. This emphasizes the importance of selecting training methods tailored to the individual motor abilities of players. The results demonstrate a significant main effect of training methods on shooting ability, highlighting that systematic method selection is a key factor in optimizing basketball skills (O et al., 2022), which aligns with previous research showing that appropriate training methods contribute to skill improvement (Ghobadi Nezhad et al., 2021).

A significant interaction between training methods and motor skills was also observed, indicating that the effectiveness of a training method depends on the player's motor profile. This is consistent with motor learning theory, which posits that learning success is highly influenced by individual motor abilities (Kiram, 2019, 2023). Players with high motor skills are better able to handle complex, game-like training that requires rapid decision-making, coordination, and execution under pressure (Lee et al., 2023; Memmert & König, 2020), and similar studies have confirmed that small-sided games can improve shooting performance and consistency in elite athletes (Giancamilli et al., 2022; Rahmawati, 2021; Nickevin et al., 2021; Linda Susila et al., 2024).

Conversely, the Progressive Method benefits players with low motor skills by providing a structured, gradual approach that allows systematic mastery of basic techniques before facing complex game scenarios (Kurniawan & Nawawi, 2020; Rusmana, 2024; Rustiono et al., 2025; Pebriani et al., 2024). This finding supports the notion that training success is maximized when methods are aligned with individual abilities (Komarudin, 2015; Saichudin & Munawar, 2019). Practically, coaches should assess motor skills prior to designing training programs to ensure appropriate method selection (Setiawan, 2022; Juanda et al., 2024; Rahmawati, 2021; Luchfi & Gazali, 2024; Pebriani et al., 2024).

However, this study has several limitations. The sample size was small and limited to UNP basketball players, which reduces generalizability. Additionally, the focus was solely on shooting ability, excluding other critical skills such as dribbling, passing, or defensive techniques. Psychological factors, including confidence or anxiety, were not examined despite their known influence on performance (Adam, 2023; Supriatna, 2023). Future research should include larger and more diverse samples, integrate multiple skill domains, and consider physical, technical, and psychological factors to provide a more comprehensive understanding of training method effectiveness.

Conclusions

The study concludes that both the training method and motor skills significantly affect basketball shooting performance. Players trained with the Game-Like Method and those possessing high motor skills demonstrated superior shooting ability. Furthermore, an interaction effect was found, indicating that the Game-Like Method is most effective for players with high motor skills, whereas the Progressive Method benefits players with lower motor skills.

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