



# The Impact of Different Attentional Focus Strategies During Modeling on the Acquisition and Retention of Free Throws in Basketball

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## Abstract

**Background:** In recent years, coaches and athletes have increasingly used observation as a tool for teaching and learning sports skills.

**Objectives:** The aim of this study was to investigate the impact of modeling, using internal and external attentional focus strategies, on the acquisition and retention of free throw shooting in basketball.

**Methods:** Forty-five female beginner basketball players (aged  $21.62 \pm 3.08$  years, with a BMI of  $23.48 \pm 0.99$  kg/m<sup>2</sup>) voluntarily participated in this study. Based on their pre-test scores using the ABBA method, they were divided into three groups: One group received modeling with an internal attention focus strategy, another group received modeling with an external attention focus strategy, and a control group. A video demonstrating the correct throwing technique was used to teach the attention-focusing strategies, and the groups did not receive any physical training. After watching the video, participants performed their own throwing attempts. Following group allocation, the participants entered the acquisition phase, which consisted of six sessions, with each session including two sets of ten attempts and a 2-minute rest period between sets. One-way analysis of variance was used for both immediate and delayed recall tests, and data analysis was conducted using SPSS 20 software."

**Results:** The study found a significant difference in free throw performance between the three modeling groups (internal attention focus, external attention focus, and control) during both the acquisition and delayed retention stages ( $P \leq 0.05$ ). Additionally, there was a significant difference in basketball free throw performance between the three modeling groups during the recall test ( $P \leq 0.05$ ).

**Conclusions:** Overall, the results suggest that observational learning, combined with attentional focus strategies, is an effective method for improving skill acquisition and retention in basketball.

**Keywords:** Modeling, Attentional Focus, Retention, Observational Learning

## 1. Background

Nowadays, sports coaches face numerous challenges, one of which is finding the most effective teaching methods. In this regard, observational learning is a method that has gained increasing attention in sports education. Modeling, in particular, is an educational approach that can significantly impact the development of sports skills at all levels (1).

Observational learning is a process in which an individual learns patterns of behavior by observing others (2). The original text is mostly clear, but there is a minor grammatical error which I would suggest correcting. Bandura's psychological theories have emphasized observational learning and suggest that learning through

observation, as well as direct experience, enhances human cognitive abilities. Numerous studies in the field of movement learning demonstrate that observational learning can significantly improve skill acquisition and enhance athletic performance (3). One of the primary goals of physical education is to develop effective educational strategies using the latest scientific methods. Coaches are constantly seeking innovative teaching methods to enhance learning outcomes (4). Developing new teaching strategies for students and athletes is a crucial challenge that physical education teachers and sports coaches face (5). Observing the pattern allows athletes to create a perceptual-motor program in their minds that fits the observed pattern, which plays a critical

role in the motor development of athletes. Observational learning and visual instructions are effective ways to learn, but it is also important to provide athletes with equal information and feedback during the learning process (6). Due to the COVID-19 pandemic and the closure of sports facilities, coaches have increasingly turned to virtual training. They utilize the modeling method to effectively convey content to athletes and provide verbal instructions to enhance understanding of the observed patterns. In the absence of virtual training, athletes, particularly beginners who have just started sports, may experience regression, reduced physical activity, and limited mobility (7). Theories of physical education and physical activity play significant roles in the field of physical education. Teaching sports movements is closely linked to new educational methods and technology. Traditional methods of physical training have given way to modern approaches, which have prompted trainers and physical training experts to develop new training methods and modes (8). “The use of modern technologies in teaching and learning has become increasingly important, and video modeling has proven to be an effective method for teaching various movement skills, including demonstrating a skilled model to athletes. According to Hoger Hyde et al. (cited in Rekić et al.), video modeling is an effective way to learn because it provides the necessary information for implementing motor skills (9). A study investigating the impact of observational learning on the acquisition and improvement of sports skills found that the use of observational learning has a significant effect on learning and improvement. However, this study did not examine the effect of the presence of verbal cues, the use of a skilled model, or self-modeling (1). Another study aimed to investigate the immediate effect of self-modeling using two different approaches of internal and external attentional focus on the teaching and learning of gymnastics movement skills. The study included 59 students with no prior experience in performing gymnastic movements, who were assigned to one of three groups: External focus, internal focus, and control group. The study evaluated parallel movements in gymnastics. The results showed that both the external and internal focus groups performed better than the control group, with the external focus group showing the highest percentage of performance improvement. This study provides support for the use of external attentional focus in teaching and learning gymnastics techniques (10).

A study titled ‘Proper Instruction Changes Movement Execution in Talented and Young Basketball Players’ aimed to investigate the impact of watching video instructions of a skilled basketball model, filmed from a side angle, on learning the most appropriate technique.

Ten young male basketball players from a talent center participated in the study. Participants were shown a video of an expert model performing two techniques and were then asked to imitate the observed movements as accurately as possible. The results indicated that the use of appropriate video instructions, along with a short interval between observing the skilled model and performing the movement, can have a positive effect on learning (11). In another study titled ‘Determining the Effect of Internal and External Attentional Focus on the Accuracy of Table Tennis Backhand’, 51 undergraduate students of physical education were randomly assigned to one of three groups. In the internal focus group, participants were instructed to focus on the hand holding the racket, while the external focus group was instructed to focus on the ball. The third group was asked to focus on specific targets. Other than the attentional focus instructions, all other instructions were identical across the groups. The results indicated that the groups with external attentional focus made more progress than the group that focused on internal attention (12). The study titled “The Effect of Video Modeling on Goalkeeping Skill Training” aimed to investigate the effectiveness of video modeling alone and in combination with video feedback in training goalkeeping skills. The researcher chose video modeling as it is a successful method in training staff and medical skills. The study involved two 9-year-old football players, and three goalkeeping skills were taught using video modeling alone and video modeling with video feedback. The results of the study showed that video modeling alone had some effect on goalkeeper performance. However, when video modeling was combined with video feedback, it led to a significant improvement in the professional performance of goalkeepers (13). In this study, the researchers aimed to fill the gap in the literature by examining the effectiveness of video modeling combined with internal and external attention strategies on the acquisition and retention of basketball free throws in beginner players. The study aimed to address the lack of research on this topic, as well as the focus on physical education students and elite players in previous studies. By examining the impact of attention strategies on free-throw shooting in beginner players, the study could provide valuable insights into effective training methods for this population. The study design, methodology, and results would shed light on the potential benefits of incorporating attention strategies into video modeling for basketball free-throw shooting.

## 2. Objectives

The hypotheses of this research are:

(1) There is a significant difference in basketball free throw performance among the three modeling groups (internal focus of attention, external focus of attention, and control) during the acquisition phase.

(2) There is a significant difference in basketball free throw performance among the three modeling groups (internal focus of attention, external focus of attention, and control) on the immediate memory test.

(3) There is a significant difference in basketball free throw performance among the three modeling groups (internal focus of attention, external focus of attention, and control) on the delayed recall test.

### 3. Methods

The current study was a practical and semi-experimental research with a two-step pre-test-post-test measurement design, including a control group. The study was conducted on 45 beginner basketball players (Age =  $21.62 \pm 3.08$  years, BMI =  $23.48 \pm 0.99$ , Height =  $171.11 \pm 4.12$  cm, Weight =  $68.83 \pm 4.66$  Kg) who were actively playing basketball for less than 1 year in Takhti Stadium in Tehran. The participants voluntarily participated in the study and were divided into three groups based on their pre-test scores using the ABBA method (Figure 1): Modeling with the strategy of internal attention, modeling with the strategy of external attention, and the control group. During the acquisition stage, which consisted of 6 sessions held every other day, the participants practiced the skill for 30 minutes without any instruction, followed by 2 groups of 10 attempts per session with a 2-minute rest between each set of attempts. The participants only watched the skilled model and videotaped instructions and did not receive any physical training. The control group only watched the skilled model and did not receive any instructions. After the acquisition stage, the participants immediately took the immediate recall test, and the delayed recall test was taken 72 hours after the last acquisition session. For the acquisition test, the analysis of variance with repeated measures was used on the factor of training sessions, and for the immediate and delayed test, the one-way analysis of variance test was used.

### 4. Results

Figure 2 suggests that there was a significant main effect of practice and interaction sessions group and training sessions on basketball free-throw shooting performance during the acquisition phase of the study. However, despite this significant main effect, there was

a lack of significant progress in basketball free-throw shooting performance among the three groups, including modeling with internal attention-focusing strategy, modeling with external attention-focusing strategy, and the control group. This suggests that the interventions used in the study did not lead to significant improvements in free-throw shooting performance during the acquisition phase.

The results presented in Table 1 indicate that during the immediate recall test, the modeling group that utilized the internal attention focus strategy performed better than the control group. However, there was no significant difference observed between the two modeling groups in terms of their performance ( $P \geq 0.05$ ).

Table 1 presents the results of the one-way analysis of variance (ANOVA) test for free throw performance among the three modeling groups in the immediate recall test. The F-ratio and P-value are provided for the between groups factor. The results show that there was a significant difference between the three groups in terms of their free throw performance in the immediate recall test ( $F(2,42) = 4.96, P = 0.012^*$ ).

The results presented in Table 2 indicate that there was a significant difference in the free-throw shooting performance of the three groups during the delayed recall test ( $P \leq 0.05$ ). The modeling group that utilized the internal attention focus strategy performed significantly better than both the modeling group with an external attention focus strategy and the control group ( $P \leq 0.05$ ). However, no significant difference was observed between the performance of the modeling group with an external attention focus strategy and the control group ( $P > 0.05$ ).

### 5. Discussion

The aim of this study was to investigate the impact of modeling with internal and external attention-focusing strategies on the acquisition and retention of basketball free-throw skills. The results indicate that modeling with attention-focused strategies is effective in learning basketball throwing skills. Furthermore, modeling with the internal attention-focusing strategy was found to be more effective in learning than modeling with the external attention-focusing strategy. These findings are consistent with the research conducted by Capalbo et al. on video modeling in football goalkeeping skill training and Aiken et al. on self-control video feedback in learning to shoot basketball. Overall, the results of this study provide further support for the effectiveness of attention-focused modeling in skill acquisition and retention (13, 14).

However, our findings were inconsistent with the results of a study conducted by Niznick Kowski et

Pretest	Grouping based on the pre-test score with the ABBA method, divided into three groups	Acquisition	20-Minute immediate recall test following acquisition	72-Hour delayed recall test following training
		Session 1-6		
10 Attempts basketball free throws	Modeling with internal attention focus strategy	Physical exercise: 2 Groups × 10 attempts		
	Modeling with external attention focus strategy	Watch the video on how to export the model and follow instructions for focusing internal attention	10	10
	Control	Watch the video on how to export the model and follow instructions for focusing external attention	10	10
		Watch the video on how to export the model with no instructions provided	10	10

Figure 1. Study design

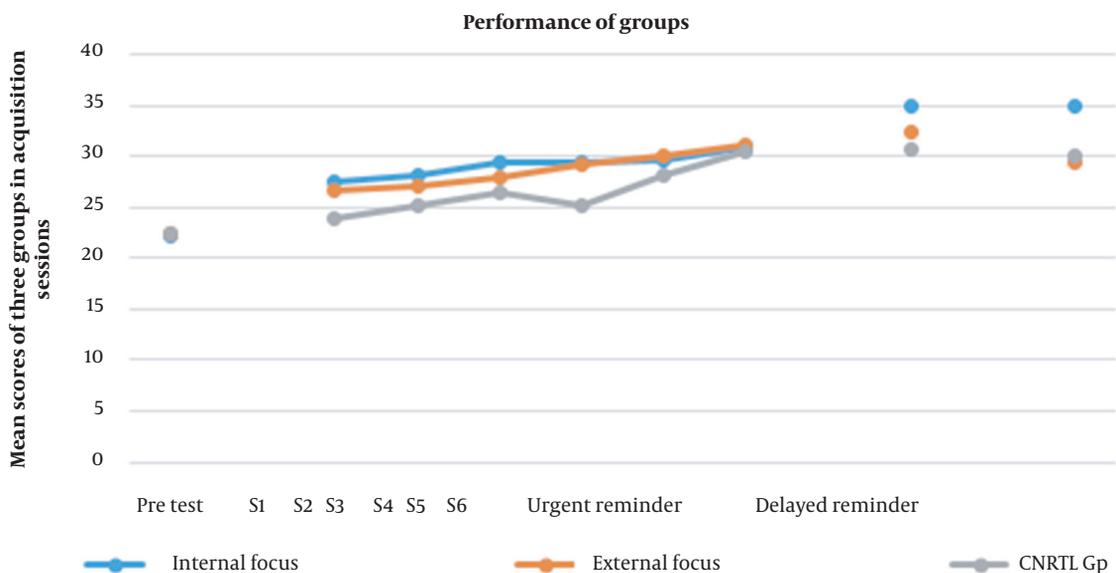


Figure 2. Performance curve of three groups during the acquisition sessions, pre-test, immediate recall test, and delayed recall test in the study

**Table 1.** Results of One-way Analysis of Variance Test for Free Throw Performance Among Three Modeling Groups in the Immediate Recall Test in the Study

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Ratio (F)	P-Value
Between groups	138.13	2	69.06		
Within group	584.66	42	13.92	4.96	0.012*
Total	722.800	44	16.427		

**Table 2.** Results of One-way Analysis of Variance Test for Free Throw Performance Among Three Groups in the Delayed Recall Test in the Study

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Ratio (F)	P-Value
Between groups	134.28	268.57	2		
Within group	514.400	12.24	42	10.96	0.001*
Total	782.978	-	44		

al. which aimed to determine the effect of internal and external attention focus on table tennis backhand accuracy in beginner players. The discrepancy in results may be attributed to differences in the number of training sessions during the acquisition phase. In the study by Niznikowski et al., participants trained for 45 minutes after receiving exercise feedback, whereas in our study, participants did not engage in any exercise during the acquisition phase. These differences in the study design may have contributed to the differing results obtained in the two studies (12). Furthermore, the results of our study were inconsistent with research on the immediate effect of self-modeling with internal and external attention focus on teaching and learning gymnastic movement skills. The discrepancy in results may be attributed to differences in the modeling techniques and the number of practice sessions. The previous research utilized self-modeling with only two practice sessions, while our study utilized skilled modeling with six practice sessions, held every other day. These differences in study design may have contributed to the varying results obtained in the two studies (10). Cognitive learning theory suggests that motor skills, as well as social skills, can be learned through observing the behavior of others. Bandura's cognitive theories emphasize the importance of learning through experience. If human learning in various fields were to rely solely on trial and error, it would impede human growth and expose individuals to danger, as well as lead to a lack of motivation. Thus, observation and modeling of skilled behaviors by others can be a valuable tool for learning and skill acquisition, as it allows individuals to bypass the trial and error process and accelerate the learning process (15).

Observational learning can be achieved through various methods, including watching videos or pictures, or observing live models while performing movements. Observing a skill allows individuals to learn strategies,

movement timing, and factors that contribute to success in performance and learning. The process of observational learning can impact learning through four key factors: Attention, arousal, capacity to repeat, and capacity to maintain the observed behavior.

Despite the significant findings, our study has several limitations. One limitation is the lack of control over the participants' motivation to learn, sleep and nutrition patterns, and psychological conditions, which may have influenced the results. Another limitation is the number of training sessions, as more sessions could have provided a more comprehensive understanding of the impact of attention-focused modeling on skill acquisition and retention. Additionally, the study included athletes with varying levels of skill, and future research could investigate the impact of motivation levels on learning and skill improvement. Moreover, the study only utilized the strategy of focusing attention on the video, and future research could explore the effectiveness of using verbal and visual strategies simultaneously. Overall, while our study provides valuable insights into the effectiveness of attention-focused modeling, further research is needed to address these limitations and provide a more comprehensive understanding of the impact of modeling strategies on skill acquisition and retention.

### 5.1. Conclusions

In conclusion, our study demonstrates that attention-focused observational learning is an effective tool for training and learning among athletes. Based on our findings, we recommend that coaches and physical education experts incorporate modeling methods with attention focus strategies in face-to-face or virtual training sessions. By utilizing attention-focused modeling, athletes can accelerate their learning process and improve their skill acquisition and retention. These findings

have important implications for the design of training programs and may aid in the development of more effective and efficient training methods for athletes across a range of sports and skill levels.

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### Footnotes

**Authors' Contribution:** Study concept and design: F. H; M. R. Acquisition of data: M. R. Analysis and interpretation of data: M. R. Drafting of the manuscript: F. H; M. R. Critical revision of the manuscript for important intellectual content: F. H. Statistical analysis: G. L. Administrative, technical, and material support: F. H; M. R. Study supervision: F. H; G. L.

**Conflict of Interests:** The authors of this study declare that they have no conflict of interests.

**Data Reproducibility:** Data for this study are available from the first author upon reasonable request.

**Ethical Approval:** The study was approved by the Ethics Committee of Shahid Rajaee Teacher Training University and was carried out in accordance with the Declaration of Helsinki.

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