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Effect of an Innovative Training Device on Basketball Jump-Shot Skill Performance Based on Motor Reaction Speed and Shooting Accuracy

Mohanad Al-Azzi, [1] Thaer Ghanim Malla Alo, [1]

[1] Department of Physical Education and Sport science, College Of Basic Education, University Of Mosul, Mosul, 41001, Iraq

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Correspondence:
Mohanad Al-Azzi
mohand.25bep4@student.uomosul.edu.iq

Abstract

Basketball is a dynamic team sport requiring speed, accuracy, motor coordination and quick thinking. According to many experts, the jump shot is one of the most important offensive skills in basketball. It can play a direct role in scoring and match outcomes. Coaches still use conventional observation to assess shooting execution although this technique is not always reliable since the movements are often rapid and complex. Modern scientific tools are therefore needed for supporting measurement and performance development.

This study aimed to design an innovative T.T.B training device for measuring and developing motor reaction speed and jump-shot accuracy in basketball and to investigate its effect on a composite jump-shot skill performance level. The researcher used the experimental method with a two-group design, including experimental and control groups, with pre- and post-tests. The study sample consisted of 20 second-year students from the Department of Physical Education and Sport Sciences, College of Basic Education, University of Mosul. The participants were allocated into two equal groups. The experimental group underwent a training program while using the innovative device, while the control group went through the same training program without using it. The training contained 24 sessions and lasted for 8 weeks.

Using the device, data was collected to measure response time and shooting accuracy. Skill performance level was calculated using a formula combining shooting accuracy and response time. To further interpret the jump-shot performance biomechanically, high-speed video recording was used. After examining the results, there were statistically significant differences between the pre-test and post-test of the experimental group in favour of the post-test. Additionally, the improvement percentage was 32.609%. The results of the post-test also showed significantly better performance of the experimental group than the control group. To conclude, the study device was able to enhance the level of skill performance of the jump shot via the combination of visual stimulation, response-time control, shooting accuracy scoring, and instant feedback.

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1- INTRODUCTION

Basketball is a dynamic team sport that involves several skills, including physical abilities, technical skills, perceptual awareness, and rapid decision-making. When it comes to basketball, a jump shot is one of the most important offensive skills that allow one to score even with defensive pressure and from different locations. After much practice, muscular strength does not solely determine success in basketball. According to experts, jump shooting efficiency is determined by motor reaction speed, shooting accuracy, visual perception, neuromuscular coordination, body balance and biomechanical control during the preparation, take-off, ball release and landing phases [1,2].

There has been a new development in sport science which suggests that objective measurement, biomechanical analysis and technology-supported feedback are really important and useful for improving basketball shooting. According to biomechanical studies, there are a number of factors that affect shooting success, including ball release angle, ball release speed, ball release height, jump height, timing of movement, and body alignment. Yet these factors can be difficult to accurately assess by observation alone, especially in the case of jump shots. The jump shot takes place in a very short span of time and needs the correct coordination between the upper and lower limbs for its completion [1,3,4].

The error diagnosis and the improvement of skill execution with the aid of high-speed video analysis, sensor-based evaluation, visual stimuli, and instant feedback tools have assumed importance [5,6]. Many coaches still depend on direct observation and subjective judgment in evaluating performance of jump shots during applied training. While experience is certainly important, many of these conventional observations do not provide accurate information about motor reaction time, shooting accuracy, or the biomechanical characteristics of the movement. Besides training an athlete's technique via repeated practice attempts, these traditional methods often work without immediate objective feedback so that the learner can modify performance from one attempt to the next. Recent studies show that feedback-based and technology-supported training can enhance skill acquisition, improve shooting accuracy, and support retention of motor learning in basketball [5,7].

Basketball shooting performance is also impacted by visual perception and attentional control. Research has shown that gaze behavior and quiet-eye characteristics relate to shooting accuracy under defensive and pressure constraints in basketball shooting [8]. Recent studies have emphasized the effectiveness of visual attention training in enhancing visual control and three-point shooting accuracy in basketball. It is a good example of how perceptual training can strengthen the connection between visual processing and motor execution in movement [9,10].

Training tools that offer visual stimuli and compel quick and accurate responses are required. The present study will fill the research gap of a training device that is simple and field-based which can combine measuring as well as development functions for basketball jump shooting. Many of the currently available techniques measure performance, shooting percentage, biomechanical analysis after the performance is done, or make use of the latest virtual and augmented reality devices which may not always be easily available in a common training environment [6,11]. The number of devices that provide feedback on motor reaction speed and shooting accuracy in the same activity is limited. Thus, the creation of a specialized device purposefully designed for measuring motor reaction speed and shooting accuracy, while giving immediate feedback, can be helpful in improving training quality for basketball shooting. It may also allow overcoming the drawback of classical assessment.

Based on this gap, the present study aimed to design an innovative training device for measuring and developing motor reaction speed and jump-shot accuracy in basketball. It also aimed to identify the effect of using this device on the composite skill performance level of the basketball jump shot among students of the Department of Physical Education and Sport Sciences. More specifically, the study sought to determine the differences between the pre- and post-tests of the experimental group in jump-shot performance level and to compare the post-test results between the experimental and control groups. Through this approach, the study attempts to provide a practical training tool that supports objective assessment, immediate feedback, and skill development in basketball.

2. Materials and Methods

2.1 Research Method

The researcher used the experimental method because it is appropriate for identifying the effect of an independent variable on dependent performance variables under controlled conditions. The study adopted a two-group experimental design with pre- and post-tests. The experimental group performed the training program using the innovative T.T.B device, whereas the control group performed the same training program without using the device. This design was selected to determine the effect of the innovative device on the composite jump-shot skill performance level, which was calculated from shooting accuracy and response time.

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Figure 1. Experimental design of the study.

2.2 Research Sample

The research sample consisted of 20 second-year students from the Department of Physical Education and Sport Sciences, College of Basic Education, University of Mosul, for the academic year 2025-2026. The participants were selected intentionally and then randomly divided into two equal groups: an experimental group and a control group, with 10 students in each group. The experimental group trained using the innovative device, whereas the control group followed the same training program without using the device. The distribution was performed by lottery to reduce selection bias and to ensure fairness between the two groups.

2.3 Homogeneity and Equivalence of the Two Groups

In the initial stage of the experiment, the homogeneity and equivalence of the two groups were verified in terms of age, height and body mass. Any differences that appeared after the experiment had to basically be due to the training program and the use of the innovative device.

Table 1. Homogeneity and equivalence between the experimental and control groups

No.	Variable	Unit	Experimental Mean ± SD	Control Mean ± SD	t-value	Sig.
1	Height	cm	175.60 ± 6.56	170.80 ± 4.93	1.84	0.081
2	Age	month	271.70 ± 20.82	264.00 ± 15.12	0.94	0.357
3	Body mass	kg	71.90 ± 7.46	69.60 ± 6.61	0.72	0.475

According to Table 1, all Sig. values surpassed the 0.05 level. The data suggests that the differences between the experimental and control groups were not statistically significant, so the two groups were equivalent before the experiment.

2.4 Data Collection Methods

The researcher needed to compile data by using the following methods.

1. He started with a comprehensive review and analysis of relevant scientific articles pertaining to shooting in basketball, motor reaction speed, skill acquisition, and technology-enabled feedback.
2. The next step involved measuring motor reaction speed using the innovative T.T.B device.
3. The third step was to measure the accuracy of a jump-shot using the scoring system within the device.
4. The calculation of skill performance level was done using a formula combining shooting accuracy and response time.
5. In the fifth step, the researcher used high-speed video recording to support descriptive biomechanical interpretation.
6. Statistical analysis was conducted using SPSS Statistics 25.

Recent research supports the use of technology-based feedback and visual training tools in basketball because they provide objective information that can improve motor learning and shooting performance [1,2,5,7]. Basketball shooting performance has also been shown to depend on visual attention, release mechanics, and coordination between perception and movement [4,8,11].

2.5 Devices and Tools Used in the Study

The innovative T.T.B device.
High-speed video camera.
Camera tripod.
Adhesive tape.
Three basketballs.
Metric calibration scale.
Indoor basketball court.
Data recording forms.
Computer for biomechanical and statistical analysis.

2.6 Description of the Innovative T.T.B Device

The innovative device was named T.T.B, which refers to Test, Training, and Basketball. It is a digital training and measurement device designed to measure and develop motor reaction speed, shooting accuracy, and skill performance level in the basketball jump shot.

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The device combines three main functions. First, it presents a visual stimulus to the player. Second, it records response time from the appearance of the visual stimulus until the completion of the shooting action. Third, it evaluates shooting accuracy according to the result of the shot. Therefore, the device works as both an assessment tool and a training tool.

Figure 2. Components of the innovative T.T.B device.

2.7 Components of the Device

1. Mini backboard: contains a light signal positioned at the center of the board to act as the visual stimulus.
2. Ultrasonic or laser sensor: placed directly under the rim to stop timing when the ball reaches the basket area.
3. LCD screen: displays the response time of each shooting attempt.
4. Control circuit: used to operate and control the device.
5. Visual light stimulus: indicates the moment at which the player should start the jump-shot action.
6. Vibration sensor: detects contact of the ball with the backboard or rim.
7. Audio feedback unit: gives an encouraging signal when the player achieves the required response time.

2.8 Device Scoring System

The device evaluates shooting accuracy according to the following scoring system:

- If the ball enters the basket directly without touching the backboard or rim, the player receives 3 points.
- If the ball touches the backboard or rim and then enters the basket, the player receives 2 points.
- If the ball touches the backboard or rim but does not enter the basket, the player receives 1 point.
- If the ball does not touch the backboard or rim and does not enter the basket, the player receives 0 points.

Figure 3. Mechanism of the T.T.B device during jump-shot performance.

Motor reaction speed was defined as the time from the appearance of the visual stimulus until the completion of the jump-shot action and ball arrival to the basket area.

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Skill performance level was calculated using the following formula:

Skill performance level = Shooting accuracy score / Response time

This formula reflects the combined relationship between accuracy and speed. A higher score indicates better performance because it means that the player achieved greater shooting accuracy in a shorter response time.

2.9 Device Calibration and Measurement Reliability

Since the T.T.B device was specifically designed for the present study, the researcher carried out preliminary field checks before using it in the main experiment. Repeated attempts were made to check the visual stimulus, sensor response, LCD display, scoring response, and sound feedback. The high-speed video footage was further compared with the sensor data to check whether the **recorded time really corresponded to the time at which** the ball reached the basket zone. Attempts that had clear sensor interruption or in which the ball arrival point was not properly tracked were repeated. Experts in the area of basketball, measurement and evaluation, biomechanics and sport training were invited to examine the device and its scoring procedure in terms of the appropriateness of its components, scoring logic, and field suitability. Through these procedures, face validity, field suitability, and practical reliability were strengthened. Given the device's novelty, future research should compare the timing precision of the device against laboratory-grade timing devices, while also reporting technical error of measurement on larger samples.

2.10 Biomechanical Analysis

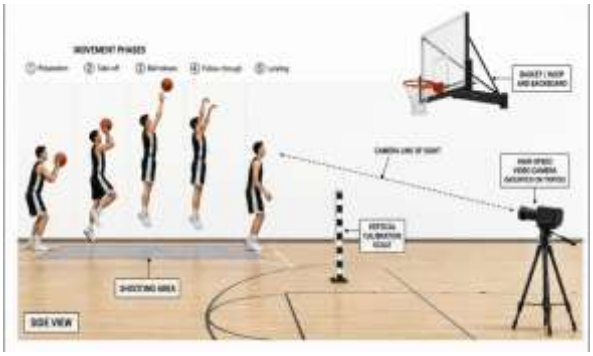

Figure 4. Biomechanical analysis setup for the basketball jump shot.

High-speed video recording supported the descriptive biomechanical interpretation of the jump-shot skill. The camera was mounted on a tripod at a good distance from the shooting place. It was verified that the camera could clearly see the main phases of the movement, including preparation, take-off, ball release, follow-through and landing on the ground. A biomechanical setup was deployed to support device-based measurements and evaluate shooting performance more objectively. This is crucial for the interpretation as the success of the jump-shot is influenced by various kinematic variables. Various factors such as release angle, release speed, release height, jump height, body alignment and movement timing are important in shooting [1,3,4]. In the current study, these variables were used for descriptive interpretation rather than as separate inferential outcomes.

2.11 Experimental Control

The researcher accounted for multiple variables for the internal as well as external validity. Both groups received their training at the College of Basic Education, University of Mosul's indoor sports hall. Both groups similarly experienced the same training time, number of sessions, the environment, the general content of the program, etc. The experimental group participated with T.T.B device, while the control group was involved in training without the T.T.B device. Both groups were instructed the same way by the same instructor.

The researcher employed the same basketballs and court along with the same data collection methods during the pre-test and the post-test. Furthermore, the camera and scoring system were consistent in both tests. The researcher took care to ensure that during the experimental time, no student got exposed to any other program. By choosing students from the same academic stage, the researcher controlled the maturation and selection effects. The researcher confirmed thatthere were no significant differences between the two groups prior to the experiment. The above processes served to confirm that the improvement was mainly due to the device-supported training program.

2.12 Main Experiment

The pre-test was held on 17/11/2025 for both groups. The students were instructed by the instructor on testing procedures after demonstrating one jump-shot test attempt. Participants were allowed two attempts as a familiarization trial prior to the test attempts.

The T.T.B device was utilized to evaluate shooting accuracy and motor reaction speed in the pre-test. The utilization of a high-speed camera allowed biomechanical support to be recorded for jump-shot performance. Both groups underwent the application of the training program for eight weeks after pre-testing, that is, from

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24/11/2025 until 15/1/2026. The training program consisted of 24 training sessions that were spread out over three training days a week for 90 min.

In the training program, the members of the control group did repeated practice of jump shots without using the device. For the experimental group, the jump-shot practice training program was conducted with the help of the T.T.B device. In terms of setting a target response time with the device, if the player's initial response time was 0.46 s, then the first target time was set lower than this value, for example 0.44 s. If the player successfully managed to perform the jump shot within the target time, then the device recorded it as a success and gave positive feedback.

If the player exceeded the target time, the device would activate an alarm signaling that the player was unable to complete the jump shot within that time. There was a gradual decrease in the target times across the training weeks, for example from 0.44 s to 0.42 s, then to 0.40 s and 0.38 s. This progressive reduction aimed to improve reaction speed while maintaining shooting accuracy.

The post-test was conducted on 18/01/2026 under the same conditions as the pre-test. The same measurement procedures, camera position, device setup, and testing environment were used.

2.13 Training Program Structure

Table 2. General structure of the training program

Variable	Description
Duration	8 weeks
Total sessions	24 sessions
Weekly frequency	3 sessions per week
Session duration	90 minutes
Target skill	Basketball jump shot
Experimental group	Training with T.T.B device
Control group	Training without device
Main training principle	Repetition, progressive response-time reduction, and shooting accuracy control
Feedback type	Immediate visual/audio feedback for experimental group

According to years of classical research, feedback is very useful in sport training because the feedback allows the learner to adjust performance after each attempt in an immediate way until the goal is achieved. Recent researchers have investigated the effectiveness of several different feedback approaches on the learning and retention of shooting in basketball, including error-based, reinforcement-based, and real-time feedback approaches [5,7]. The approaches based on virtual and sensor-based sport training systems provide more objective and repeatable learning environments compared with traditional observation alone [11,12].

2.14 Statistical Analysis

The researcher used SPSS Statistics 25 to analyze the data. The following statistical methods were used:

Mean.
Standard deviation.
Coefficient of variation.
Percentage of improvement.
Paired-samples t-test.
Independent-samples t-test.
Cohen's d effect size.

The percentage of improvement was calculated using the following formula:

Percentage of improvement = [(Post-test - Pre-test) / Pre-test] × 100

Cohen's d was recommended to determine the practical magnitude of the training effect, especially because the sample size was small. Statistical significance was set at $p \leq 0.05$.

3. Results and Discussion

3.1 Designing the Innovative T.T.B Device

The first objective was achieved by designing the innovative device T.T.B. It is a digital training and measurement tool for basketball jump-shot performance. It can measure motor reaction speed, shooting accuracy and the overall level of skill performance. The device works by showing a visual stimulus to the basketball player, as discussed in the Introduction Chapter. The apparatus keeps track of the duration it takes after a stimulus has appeared until the execution of a shot. At last, the T.T.B device scores the accuracy of the shot according to the outcome of the attempt. Thus, the device, in addition to serving as a measuring and evaluation tool, also serves as a training tool for the player to modify performance from one attempt to the next.

By training the jump shot, the player can measure motor reaction speed, shooting accuracy and the overall level of skill performance. As a result, the device assists the player in obtaining immediate feedback and determining how to change performance from one attempt to the next. Consequently, jump-shot training can be a controlled and measurable training task rather than a random practicing task.

During the training session, coaches typically observe whether the player is repeating the skill several times and whether the player is performing the skill better as a function of training. However, this may not be the case. The coach could not know if the player was just

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faster to start his shooting motion, or just shooting more accurately, or using better coordination of movement.

The T.T.B device addresses this limitation by linking accuracy with response time through the formula: Skill Performance Level = Accuracy Score / Response Time. Improvement of performance requires reduced response time and no decrease in shooting accuracy. This methodology coincides with recent trends in sport training that enlist feedback-based, technology-supported systems to enhance motor learning with technical correction in basketball [15,20,21].

3.2 Differences Between the Pre- and Post-tests of the Experimental Group

Table 3. Differences in skill performance level between the pre- and post-tests of the experimental group

Test	Mean	SD	Improvement %	t-value	Sig.
Pre-test	1.601	0.270	32.609%	7.360	0.000
Post-test	2.033	0.112			

The researchers state that the result in Table 3 shows there were statistically significant differences between the pre-test and post-test of the experimental group in the skill performance level of the basketball jump shot. The pre-test average score was 1.601, while the post-test average score was 2.033. The percentage improvement came to 32.609%, and the Sig. value was 0.000, which is less than the required level of significance ($p<0.05$). Consequently, the performance of the jump shot improved due to the training program supported by the T.T.B device. Therefore, the device contributed greatly to the improvement in the performance of the jump shot.

This improvement can be explained by the nature of the device-supported training. The device provided a visual stimulus, required a quick motor response, measured response time, and evaluated shooting accuracy immediately. Thus, the improvement was not only the result of repeated shooting attempts, but also purposeful repetition supported by immediate feedback and objective measurement.

The final score is calculated using the equation: accuracy score/response time. Thus, a higher final score implies that the player is capable of producing an accurate shot in less time. In basketball, it is particularly important to reduce response time while maintaining accuracy because the jump shot is usually performed under defensive pressure and within limited time. The overall improvement is meaningful and related to the practical demands of the game.

The recent evidence suggests that visual attention, gaze behaviour, ball-release mechanics, and motor timing affect basketball shooting performance [9,14,17,24]. The movement quality of the shooter, release timing, release angle, release speed, and stability of visual control suggest that shooting success and efficiency are not determined purely by whether the ball goes in the basket. As such, the T.T.B device may have helped with better performance through enhanced visuo-motor integration.

The result reflects contemporary evidence regarding training supported by feedback. Studies demonstrate that technology-supported feedback systems and augmented training environments can enhance the quality of technical correction and learning of a basketball shot [15,20,21].

The present study indicated that players could identify the success or failure of their attempt in terms of time and accuracy through the immediate feedback provided by the device. The feedback should assist with correcting errors, improving timing, and stabilizing the movement pattern over repeated trials.

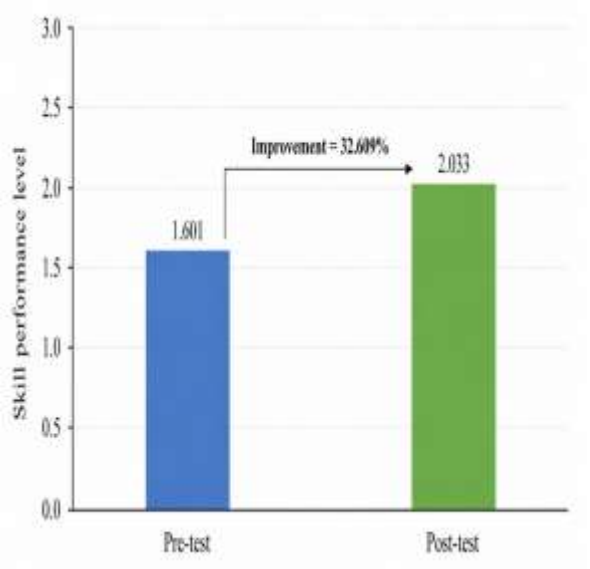

Figure 5. Improvement percentage in skill performance level of the experimental group.

3.3 Post-test Differences Between the Experimental and Control Groups

Table 4. Differences in skill performance level between the experimental and control groups in the post-test

Group	Mean	SD	t-value	Sig.
Control group	1.386	0.303	6.340	0.000

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Experimental group	2.033	0.112	

According to the post-test of skill performance level, as presented in Table 4, there are statistically significant differences between groups. Each group of the experiment was involved in the same general training program and performed the same number of practice attempts. The group trained using the T.T.B device achieved higher levels of performance than the group trained without the device. Mean scores reveal that the experimental group outperformed the control group in the post-test, where the experimental group recorded 2.033 against 1.386 for the control group. In addition, the significance value was 0.000, less than 0.05, in favour of the experimental group. The study's findings confirm that use of the device adds training value over and above that afforded by a traditional training programme.

The two groups executed the identical general training program. However, the experimental group additionally trained specifically with visual stimulation, response-time recording, scoring of accuracy, and immediate feedback. On the other hand, the control group practiced the skill without device features. According to the results, the higher training value of the experimental group is due to the use of the T.T.B device.

The Table 4 results of basketball jump-shot performance show that the experimental group is superior, and this can be interpreted based on the notion of purposeful and measurable practice. In the experiment, the control group exercised mainly on the basis of repetition and coach observation, which may enhance performance marginally.

In addition, the experimental group subjects got immediate feedback after each trial which probably enhanced attention focus, motivation and control of performance errors. Recent studies demonstrate a similar finding, where performance improved when feedback was provided and when basketball shooting training was supported by a device, as opposed to shooting training alone [15,20,21]. The system for training with the T.T.B device was also programmed to progressively challenge the learner.

The target response time was progressively reduced between the first training day and the last. This required the subject to continuously and accurately perform the basketball jump shot. Consequently, it is likely that the steadily decreasing nature created an increased perceptual-motor control and neuromuscular coordination demand on the player. In fact, experimental investigations regarding basketball shooting demonstrate that attentional focus, movement consistency, and visual control of players under pressure and fatigue affect outcomes [18,19,23]. It can be assumed that the T.T.B device may be able to improve the ability of players to organize performance rhythm and maintain shooting accuracy. Moreover, this finding is also in conformity with evidence for differential and specific shooting training, and indicates a possible role of structured variations, feedback, and definite performance targets in improving shooting effectiveness among youth players and developing athletes [16].

The T.T.B device provided this type of structured environment. This device provides a combination of visual stimulus, a timing demand, an accuracy score, and feedback within the same task. As a result, the players in the experimental group were not only repeating the jump shot, but were also learning how to perform it more efficiently.

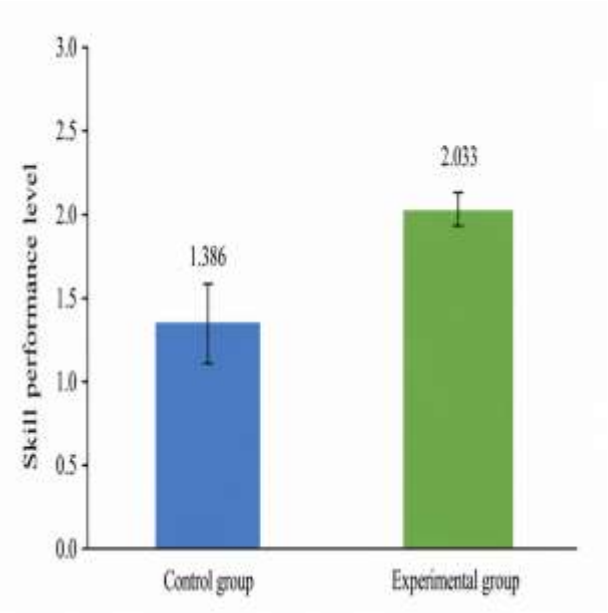

Figure 6. Post-test comparison between the experimental and control groups in skill performance level.

3.4 Discussion

As per Table 4, the overall outcomes of the study reveal that T.T.B was an effective intervention in improving basketball jump-shot performance. The gain scores of the experimental group between the pre-test and post-test and the superior performance of the experimental group over the control group in the post-test show that the device-based training programmed has a positive effect on the development of skill. The essential components must have been integrated to produce that impact, namely visual stimulation, response-time control,

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and feedback on shooting accuracy, all of which are present in the device. By establishing a link between speed and accuracy, the unique device improved performance.

Basketball's fast but inaccurate execution is not useful for effective performance. Execution that is correct but slow may also be ineffective due to defensive pressure. Thus, the device's worth goes beyond training alone, and instead lies within training both components together. It assisted the players in minimizing reaction time without compromising accuracy in shooting execution quality. Due to training both speed and accuracy together, it is clear that the performance level of the skill improved in the experimental group. Moreover, the results imply that observation alone is limited in evaluating fast and complex sports skills. The jump shot consists of preparation, take-off, release, follow-through and landing phases. Moreover, the phases happen quickly and so may not be readily evaluated by observation alone.

Latest studies have shown that there are biomechanical and perceptual indicators that affect shooting performance. These indicators include release angle, release speed, release height, jump height, gaze behaviour and timing of vision [9,14,17,24]. Consequently, the use of the measurement apparatus together with the high-speed video analysis provides a more objective profile for judging performance. Overall, the current research supports the use of smart and field-based training tools in basketball development. When they come as coaching devices, they may aid in moving from subjective judgement to objective measurement and from ordinary repetition to feedback-based learning. A simple technology embodiment is the T.T.B device which enhances skill performance within an applied sports science environment.

4. Conclusions and Recommendations

4.1 Conclusions

According to the study results, the new T.T.B. device was successfully designed as a device that could be immediately used to measure and develop the motor reaction speed of a basketball player, shooting accuracy and jump-shot skill performance. The device demonstrated efficacy because of the integration of the visual stimulation, response-time recording, accuracy scoring and immediate feedback within a common training task. The hybridization enhanced the device to create a training environment that is more objective and interactive as compared to only practice. The findings further revealed that the experimental group improved significantly in the jump-shot skill performance from pre-test to post-test. The improvement percentage of 32.609% indicates that the proposed training program supported by the device had an effect on the development of performance. The improvement amount underlines that the device has the ability to improve the relationship between speed and accuracy, which is one of the most important requirements for successful jump shooting in basketball.

Another proof of the effectiveness of the device is the comparison of the scores of the experimental and control groups in the post-test. The experimental group had superior scores, which confirms that the device has effective training value beyond mere repetition of the task. It is likely that the use of visual stimuli and immediate feedback improved perceptual-motor responses, neuromuscular coordination, and purposeful repetition potential.

To summarize, the study reveals that the T.T.B device may be successfully used as a training and measurement tool to develop basketball jump-shot performance among university students.

4.2 Recommendations

In light of the above results, basketball coaches may wish to consider using the T.T.B device in training programs designed to develop jump-shot performance when the training objectives are both the speed of reaction and the accuracy of the shot. It could be the case that university students, youths and developing players would be the best users of this device. The link between speed of response and accuracy would be something they could immediately see due to the feedback.

Basketball trainers should use technology to aid the feedback aspect of the training session rather than relying merely on observation. Utilization of technology feedback support probably helps players notice their errors more quickly, thus allowing them to modify their performance in a more efficient manner. In addition, employing visual stimuli, managing timing control, and assessing task accuracy may enhance motivation while also boosting the specificity of training in relation to the demands of actual game play.

In future research, it is essential to investigate the T.T.B device's effectiveness on other basketball skills. This may involve set shooting and three-point shooting, but may also involve dribbling followed by shooting and passing accuracy.

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Additional research involving larger samples and various populations is warranted. Similar studies involving female players and competitive basketball players will inform whether and how results can be generalized to larger basketball populations.

Future studies should also include more biomechanical variables, such as release angle, release speed, release height, jump height, body alignment, and movement timing, in order to explain the mechanisms behind performance improvement more precisely. Finally, workshops and training courses should be organized for basketball coaches to introduce the mechanism of the T.T.B device and demonstrate how it can be used effectively within training units.

Study Limitations

The small size of the sample is one of the major limitations of this study. This means the experiment took place only on 20 college students. Accordingly, the findings of the research should be used only for this population. We cannot generalize the results to all basketball players without further studies involving diverse samples. In addition to this, only jump-shot performance was assessed. Other offensive skills were given no focus. The inferential analysis also focused on the composite skill performance level derived from shooting accuracy and response time. In future studies, we should include response time, shooting accuracy, and biomechanical parameters as separate outcome variables in addition to the composite index.

Author Contributions

The author contributed to the creation of the T.T.B innovative device research concept and design, preparing the training program, collecting and analyzing the data, interpreting the results, and drafting the final manuscript. The final version should be reviewed and approved by all listed authors before submission.

Conflict of Interest

The author declares that there is no conflict of interest related to this research.

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This research did not receive any financial support from public, private, or non-profit organizations.

Data Availability

The data supporting the findings of this study are available from the author upon reasonable request.

Ethical Considerations

The study was conducted in accordance with the ethical standards of scientific research. Participants took part voluntarily after the study objectives were explained, and confidentiality and privacy were guaranteed.

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