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Comparison of Training Methods Using Robopong Assistants and Trainers to the Results of Table Tennis Smash

Ricky Riswansyah[1], Tian Kurniawan[2*]

1,2 Department of Sport Science, Universitas Pendidikan Indonesia, Indonesia

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Correspondence

Tian Kurniawan
E-mail:
tiankurniawan@upi.edu

Abstract

The purpose of this study was to find out whether there is a difference in the effect between training assisted by a trainer and training with Robopong aids. Thirty sports science student class of 2017 were divided into two groups. The first group was a group that was trained with the help of a trainer, and the second group was a group that practiced with Robopong tools as treatment. All subjects attended ten face-to-face meetings; the first meeting was for pre-testing, eight meetings for treatment/treatment, and the last meeting for post-testing. Their basic technical skills are measured using the Table Tennis Basic Technique Test Instrument in the first and third sessions. The first session was to find out the ability of the subject, and the third session was to find out the ability of the subject after the treatment session. The study showed that both treatments had a positive effect on increasing mastery of basic smash techniques, but there was no statistical difference between the two groups. These findings indicate that both treatments (exercise) can improve mastery of basic smash techniques in table tennis, and both can be used as a form of exercise variation to reduce athlete's boredom.

Keywords: robopong, training media, table tennis, smash, trainers

Abstrak

Tujuan penelitian ini adalah untuk mengetahui ada tidaknya perbedaan pengaruh antara latihan dengan bantuan pelatih dan latihan dengan alat bantu Robopong. Tiga puluh mahasiswa Ilmu Keolahragaan angkatan 2017 dibagi menjadi dua kelompok. Kelompok pertama adalah kelompok yang dilatih dengan bantuan pelatih, dan kelompok kedua adalah kelompok yang berlatih dengan alat bantu Robopong sebagai perlakuan. Semua subjek mengikuti sepuluh kali pertemuan tatap muka; pertemuan pertama untuk pre-test, delapan kali pertemuan untuk perlakuan/treatment, dan pertemuan terakhir untuk post-test. Keterampilan teknik dasar mereka diukur menggunakan Instrumen Tes Teknik Dasar Tenis Meja pada sesi pertama dan ketiga. Sesi pertama untuk mengetahui kemampuan subjek, dan sesi ketiga untuk mengetahui kemampuan subjek setelah sesi perlakuan. Hasil penelitian menunjukkan bahwa kedua perlakuan tersebut berpengaruh positif terhadap peningkatan penguasaan teknik dasar smash, tetapi tidak terdapat perbedaan statistik antara kedua kelompok tersebut. Hasil penelitian ini menunjukkan bahwa kedua perlakuan (latihan) tersebut dapat meningkatkan penguasaan teknik dasar smash tenis meja, dan keduanya dapat digunakan sebagai salah satu bentuk variasi latihan untuk mengurangi kejenuhan atlet.

Kata kunci: robopong, media latihan, tenis meja, smash, pelatih

Introduction

Table tennis, a sport that requires agility, precision, and tactical intelligence, was invented in England around the 19th century. Initially, it was played by the upper class as an after-dinner entertainment. The game has gone by various names, including "whiff-whaff" and later "ping-pong," which became a widely recognized term. Historical records suggest that British soldiers in India or South Africa first developed the game before bringing it back to England. As a competitive sport, table tennis is played by a minimum of two players (singles) and a maximum of four players (doubles).

From a terminological perspective, Yulistianto (2016) defines table tennis as a game in which players use a paddle to strike a ball, requiring it to cross the net and bounce on the opponent's side of the table. According to Hodges & Nasution (1996), the fundamental equipment needed to play table tennis includes a bat, a game table, a net, and a ball. These components vary in specifications depending on the level of play, with professional athletes using higher-quality equipment compared to amateur players. The difference in equipment can significantly impact gameplay, particularly in terms of speed, spin, and control (Fan et al., 2017).

In table tennis, two of the most fundamental techniques are the smash and spin strokes. A smash is a powerful hitting technique that propels the ball in a straight trajectory without inducing significant rotation. In contrast, a spin stroke involves both translational motion and rotational effects, making the ball's movement more unpredictable. Given these characteristics, the smash technique is often considered the easiest to measure objectively, as it does not require analyzing the effects of torque on the ball. Nurhasan (2004) identifies two key factors that contribute to an athlete's success: training quality and supporting factors. Supporting factors can be categorized into intrinsic (e.g., talent, motivation) and extrinsic (e.g., facilities, equipment, coaching, and research findings).

Several studies have examined the effectiveness of different training methods in table tennis. Liu et al. (2018) investigated the relationship between reaction time and ball speed, concluding that systematic training improves motor response and decision-making in high-performance athletes. Meanwhile, Sors et al. (2020) explored the impact of auditory feedback on table tennis performance, highlighting that real-time feedback can enhance precision and consistency. Another study by Wang & Zhang (2021) compared different coaching strategies and found that incorporating automated training tools significantly improved players' ability to execute repetitive stroke patterns with higher accuracy.

An effective training method serves as a critical tool to facilitate skill acquisition, enabling efficient communication between coaches and athletes. The selection of appropriate training media plays a vital role in improving training outcomes. One such technological innovation in table tennis is the Robopong tool, an automated ball-feeding machine that provides a consistent and structured training environment. The integration of Robopong in training programs can introduce variety, enhance engagement, and reinforce technical skills (Teychenne et al., 2019). When students have already mastered the fundamental smash technique, incorporating training media such as Robopong can further refine their skills.

In the modern era, technology has increasingly replaced human roles across various fields, from automated food production to digitalized toll payment systems. This raises an important question in the domain of sports training: Can technology effectively replace the role of a human coach? Studies by Zhu et al. (2022) suggest that while training machines provide advantages in consistency, they lack the adaptability and personalized feedback that a coach can offer. However, Jiang et al. (2023) argue that integrating AI-driven training tools can bridge this gap by incorporating adaptive learning algorithms.

Based on the issues outlined above, this study seeks to examine the comparative effectiveness of training using Robopong versus training under a coach's supervision in enhancing table tennis smash performance. The findings of this study are expected to provide insights into the potential role of technology in sports training and whether automated training tools can serve as a viable alternative or complementary method to traditional coaching.

Methods

Research Design

The research design in this study is a comparative analysis between training methods using robopong tools using trainers (people) on results in table tennis smash techniques.

Participant

Participation is shown to sports science student class of 2017 who have not or cannot play table tennis. The population referred to in this study were all sports science student class of

2017, a total of 117 people. The sample in this study were 30 people or 15 people per group.

Instrument

Ball throwers (Robopong, China) are used to ensure that the supply of balls on the subject is constant. The ejection period used is 4 seconds per ejection. The position of the ball thrower is on the cross diagonal of the smash.

Speed Guns (Bushnell, Germany), function to calculate the speed of the ball at the time of the smash.

Procedure

The first step of data collection was with the initial test (Pre-test) and the final test (Post-test) throwing the ball into the middle and bouncing high so it was easy to smash. The smash shot was aimed at the center of the table and then the sample did the smash which had been divided into sections with each area of the box that had been given a score. In this study, the sample in question was sports science student class of 2017 who did not yet have an above average smash technique. Each sample performs a smash technique of 10 blows which has been given a score. Data collection is done by measuring the smash using a speed gun and judging from the accuracy of the ball falling on the score that has been divided in each field.

The research procedure was carried out systematically to ensure accurate data collection and analysis. First, the researcher determined the population, which consisted of Sports Science students from the 2015 cohort. From this population, a sample of 10 students was selected and divided into two groups, with each group consisting of 5 participants. Before the intervention, all participants underwent a pretest, specifically an initial smash test, to assess their baseline performance. Following the pretest, the participants were assigned to either the ROBOPONG group or the non-ROBOPONG group, ensuring equal distribution. The ROBOPONG group received training using the ROBOPONG system, while the other group trained without it. Both groups underwent a structured training regimen over the course of eight sessions, allowing for the evaluation of any improvements resulting from the intervention.

Data Analysis

Researchers used SPPS software version 22.0 to help with data processing and used the Independent simple t-test. Hypothesis testing was carried out to find the closeness of the relationship between the two variables.

Result

After carrying out the Smash Test testing of 15 treatment groups and 15 control groups of 2017 sports science students conducted at the FPOK Sport Science Laboratory, researchers obtained data in the form of smash technique analysis scores. In order for the data obtained to have meaning, data processing or data analysis is carried out in accordance with the steps described in the previous section. By processing the data that has been collected, researchers can find answers to the formulation of the problem that has been prepared, namely to find out whether there is an influence from training using ROBOPONG tools and not using ROBOPONG on mastering basic table tennis smash techniques.

Description Data

Data description is a processing stage to obtain information about the data. The data described are as Table 1 and Table 2.

From the Table 1, indicate changes in performance among the participants who used ROBOPONG. In the pre-test, the 15 participants in this group achieved an average score of 17.07, with the highest individual score recorded at 21 and the lowest at 14. The standard deviation of 3.25 suggests a moderate variation in participants' initial performance levels. However, after undergoing the intervention, the post-test results revealed a decrease in the average score to 15.73. The highest score in this phase was 18, while the lowest remained at 14, with a reduced standard deviation of 1.22. This decline in standard deviation indicates a more consistent performance across participants in the post-test phase. The observed differences suggest that the use of ROBOPONG influenced skill execution, potentially leading to a more uniform level of performance among participants. Further analysis is necessary to determine whether these changes were statistically significant and to explore the contributing factors behind the performance shifts.

Table 1. Descriptive Group Data Using Robopong

No	Test	Min	Max	Mean	Std. Deviation
1	Pre-test	14	21	17.0667	2.25093
2	Post-test	19	25	21.7333	1.79151

Table 2. Descriptive Group Data Using Robopong

No	Test	Mini	Max	Mean	Std. Deviation
1	Pre-test	14	18	15.7333	1.22280
2	Post-test	18	23	20.2000	1.47358

Table 3. Paired Sample T-test

No	Variable	T	Sig.	Description
1	Group Using Robotpong	7.115	0.000	**There is a significant increase**
2	Groups Not Using Robopong	9.788	0.000	**There is a significant increase**

Table 4. Independent sample T-test

Variable	T	df	Sig.	Description
Difference in Pretest Post Test in Two Sample Groups	0.331	28	0.743	**There is no significant difference**

The data in Table 2 illustrate the performance changes among participants who did not use ROBOPONG. In the pre-test, the 15 participants in this group achieved an average score of 15.73, with scores ranging from 14 to 18. The standard deviation of 1.22 suggests that initial performance levels were relatively consistent across participants. However, in the post-test phase, the group demonstrated a significant improvement, with the average score increasing to 20.20. The highest score recorded was 23, while the lowest was 18, and the standard deviation slightly increased to 1.47. This upward

trend in scores indicates a notable enhancement in skill execution among participants who followed conventional

training methods. The slight increase in standard deviation suggests some variability in individual performance improvements. Further analysis is needed

to determine the factors contributing to this improvement and whether the difference between the two training methods is statistically significant.

data is normally distributed and homogeneous, then data processing is carried out with parametric statistics using the Paired Sample t Test to see whether there is an increase in training using Robopong for 2017 Sports Science students and whether there is an increase from the group that does not use Robopong. With a sig value > 0.05, there is no significant increase, and if the sig value < 0.05, there is a significant increase. The results of data processing can be seen in Tables 3 and Table 4.

Table 3 presents the results of the data analysis using the Paired Sample t-Test for both groups. In the

value of 7.115 with a degree of freedom (df) of 14 and a significance value of 0.000. Given that the p-value (P = 0.000) is less than 0.05, it can be concluded that there was a statistically significant improvement in performance within this group after the intervention. Similarly, in the group that did not use ROBOPONG, the t-test analysis produced a t-value of 9.788, with the same df of 14 and a significance value of 0.000. Since the p-value remained below the 0.05 threshold, this finding also indicates a significant improvement in performance for the non-ROBOPONG group. These results suggest that both intervention methods led to meaningful performance enhancements, warranting further investigation into the factors contributing to these improvements.

Table 4 presents the results of the Independent Sample t-Test, which compares the performance outcomes between the ROBOPONG and non-ROBOPONG groups. The analysis, conducted on 30 participants, yielded a t-value of 0.331 with 28 degrees of freedom (df) and a significance value of 0.743. Since the p-value (0.743) is greater than 0.05, the results indicate no statistically significant difference between the two groups.

These findings suggest that while both training methods led to improvements in performance, the presence or absence of ROBOPONG did not create a meaningful difference in outcomes. This result aligns with the notion that multiple training approaches can be effective in enhancing skill execution. Further research may be needed to explore additional variables, such as training duration, individual skill levels, or psychological factors, that could influence the effectiveness of different training methods.

Discussion

Based on the findings from the previous discussion, the researcher found that all samples experienced an increase in their mastery of the basic Smash technique. Both samples received training using Robopong and samples that received training by trainers (not using Robopong). This increase is due to the exercises being carried out in accordance with the technical training rules expressed by Santosa (2005), that there are limits that cannot be violated in technical training, namely that repetition of the movement must not cause fatigue to one or several of the muscles concerned. All samples were trained equipped with a Heart Rate Monitor, when the pulse is high or the athlete is tired, the drill is stopped.

Apart from that, to improve technical skills, it takes a lot of drills or repetitions in carrying out the techniques being trained. Because the number of training drills given to all samples was the same, the improvement in basic Smash technique skills in the two sample groups should not have been much different.

This makes the hypothesis that the researcher has described in the previous chapter, namely that different forms of training have different effects on mastering the basic smash technique, can be refuted. Because from the findings above, it can be concluded that the two forms of training, namely training using Robopong and training without using Robopong, have the same effect. Both forms of training both improve Smash's basic technical abilities.

According to Luxbacher, basic techniques are all the movements that underlie the game, and with that capital one can play well (1987, p. 11). So that the two forms of training can be used as a reference for coaches to train their students' basic smash technique in a more varied way.

The varied exercises aim to reduce boredom because practicing the basic smash technique which is done repeatedly will make students feel bored and bored. This is in line with the training principle put forward by Bompa (1994) and Marten (1990) quoted by Giri Wiarto (2013, p. 153) "When doing continuous training, athletes will definitely feel bored if the form and model of training given is monotonous. . To avoid boredom and boredom, the exercises must be arranged in a variety of ways.

Although this research does not prove that training using Robopong with training with a trainer is not significantly related, both have a significant effect on improving basic smash technique skills. So that both of them can be used as variations of basic smash technique exercises so that students don't get bored practicing, but still pay attention to aspects of good and correct technique training.

Conclusion

Based on the results of data processing and analysis, the researchers concluded that training using Robopong tools and training assisted by trainers had the same effect. The results show that there is no significant difference in the effect of training in the two sample groups.

From this study it was found that training by following aspects of good technical training will have an influence on mastery of techniques even with different forms of training.

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