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IMPLEMENTATION OF THE OPTIMAL THEORY OF MOTOR LEARNING IN PLYOMETRIC EXERCISES TO IMPROVE LONG JUMP RESULTS

JAMALUDDIN [1]*, MUH SAID HASAN [2] and MUSLIM [3]

[1, 2, 3] Universitas Negeri Makasssar, Makassar, Indonesia.
Email: [1]jamaluddin6306@unm.ac.id (*Corresponding Author), [2]said75hasan@unm.ac.id, [3]muslim@unm.ac.id

Abstract

This study aims to determine the effect of implementing The OPTIMAL theory of motor learning on Plyometric Exercises to Improve Long Jump Results. This study used a test-experiment with the research design "Single-Group Pretest-Posttest Design". This study involved 40 samples from male and female students who were then divided into a training group (Group A) totaling 20 samples and a control group (Group B) totaling 20 samples through random sampling technique by drawing lots. The instrument used was the Long Jump Test. Prior to testing the hypothesis, the Liliefors test was used to test whether the data was normally distributed and the Bartllet test was used to test homogeneity. Then an effect test (t-test) was carried out with the help of the Statistical Product and Service Solutions (SPSS) version 22 application. The results of the study can be concluded that; 1) there is a significant difference between the pretest and posttest of the OPTIMAL theory of motor learning-based plyometric exercise group. 2) There is a significant difference between the posttest (after treatment) Plyometric Exercise Based on The OPTIMAL theory of motor learning and the control group in increasing long jump results.

Keywords: Long Jump, The OPTIMAL, Plyometrics

INTRODUCTION

The ability of a teaching staff in managing a class must always be in synergy with various developments of the times, one of them is by paying attention to, adopting, or modifying the latest and most up-to-date learning concepts or theories. Conceptual, pedagogical, cultural, and political factors greatly influence the teaching and learning process and the implementation of models in the field(Harvey et al., 2020). The important things that must be prepared in order to produce an optimal teaching and learning process are policies, environment, curriculum, appropriate instructional learning, and assessment governance originating from the latest sources(Michael et al., 2021).

The key to success in producing creative teaching starts with the personality of the teaching staff in paying attention to the development of learning that is in line with the level of support of the educational institution, but if not, the teaching staff must be firm in a situation of resilience(Deng, Zheng, & Chen, 2020). Modern teaching staff must equip themselves with teaching skills, stimulate interest, foster healthy living habits through physical activity and exercise, increase courage and tenacity, and encourage harmonious development (physical, psychological and social), by integrating new and old teaching methods to produce more effective teaching methods(Xiong et al., 2020).

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Learning which presents interesting and varied content, technology and innovation can increase the attractiveness of students in undergoing physical education(Andrade et al., 2020). This means that treatment, physical activity, any exercise used if it does not rely on the latest learning concepts or theories will produce results that are not much different from previous results.

The latest learning theories which are currently still being discussed and implemented in the world of education, especially physical education, which is The OPTIMAL theory of motor learning. The OPTIMAL theory of motor learning is a theory that optimizes motor performance by maximizing intrinsic motivation and attention for learning. In order to maximize intrinsic motivation and attention for learning, there are three things that must be considered, which are autonomy support (AS), enhanced expectancies (EE), and external focus of attention (EF)(Wulf & Lewthwaite, 2016).

It was further explained that motivation and attention can strengthen the combination of goals and actions, autonomy support (AS) allows to increase performance during learning/training through the provision of "hope" stimulants, external focus of attention (EF) increases efficient functional connections across networks a brain catering to skilled movement when compared to the use of internal attention, enhanced expectancies (EE) will lead to further success and help consolidate memory(Wulf & Lewthwaite, 2016),(Chua, Wulf, & Lewthwaite, 2018),(Wulf et al., 2018),(Levac et al., 2017).

A simple example of autonomy support (AS), for example, is that students are more receptive if they use “How does 10 reps sound for this exercise?” compared to using "Do 10 reps of this exercise!", so that students do not feel coerced to practice/learn. A simple example of enhanced expectancies (EE) is such as providing feedback regarding the correct movements made by students compared to discussing their mistakes, the second example is by changing the way students think about the difficulty of the task by saying "you have practiced hard, therefore you can complete the movement" and different when the teacher says "the movement is difficult but can be solved by practicing".

The third example is to improve students' conceptions regarding their abilities, it is much better for a teacher to use an incremental theory approach, namely "practice/learn as much as possible and as much as you can, your skills will increase", when compared to using an entity theory approach, namely "the ability (motor) of each person is different, so practice/learn as much as Possible". A simple example of external focus of attention (EF) is asking students to focus on the purpose of a movement, not on how their body moves.

Various studies have shown an increase in learning/practice results in accordance with The OPTIMAL theory of motor learning. Improving students' Futsal shooting abilities using learning based on external focus of attention(Oftadeh et al., 2022). Improving the ability to shoot basketball for elite and amateur athletes using learning based on external focus of attention(Gou, Li, & Wang, 2022). Improving student motor learning outcomes for simple motor movements using The OPTIMAL theory of motor learning(Pollok et al., 2022).

The ability of athletes to complete training tasks in the sport of golf(McKay & Ste-Marie, 2020), as well as long jump performance and student motivation in long jump(Simpson et al.,

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2020), is very closely related to the external focus of attention (EF), enhanced expectancies (EE), and autonomy support (AS) which are the focus of The OPTIMAL theory of motor learning.

Regarding to long jump performance, researchers, physical education teachers, and coaches generally use plyometric training to improve long jump performance results. Improving long jump results (students) using plyometric single leg speed hop and double leg speed hop plyometric exercises(Yatindra, Swadesi, & Wahyuni, 2017).

Improving the long jump squat style (students) using plyometric skipping and alternate leg bound exercises(Sartono, 2017). Improving the results of long jump hanging style (athletes) using standing long jump plyometric exercises(Yukarda, Pujianto, & Arwin, 2019). Improving the results of the long jump squat style (athletes) using plyometric single leg speed hop and double leg speed hop exercises(Oktaviani, Sugihartono, & Arwin, 2019). Improving triple jump results (students) using plyometric exercises(Sobarna et al., 2019). Improving long jump results (students) using plyometric exercises(Izzullaq, Hariadi, & Hanief, 2022).

Based on various empirical evidence showing the useful effect of The OPTIMAL theory of motor learning and plyometric training to improve the results of long jump performance, the researcher in this case proposes research that aims to improve students' long jump performance through plyometric exercises implemented using the principles of The OPTIMAL theory of motor learning. OPTIMAL theory of motor learning, bearing in mind that no research has attempted to combine the two treatments. The combination of the two treatments "the concept of training and the concept of learning" can be a novelty in the learning process of physical education and long jump learning materials.

METHOD

This study used a test-experiment with a Single-Group Pretest-Posttest Design. The research location (practice) was at the FIK UNM Banta-Bantaeng Campus Athletic Field, Makassar City. This research was conducted from January to February 2023. This research involved 40 samples from male and female students who were then divided into groups of Plyometric Exercises Based on The OPTIMAL theory of motor learning (Group A) totaling 20 samples and the control group (Group B) who underwent plyometric training without applying The OPTIMAL theory of motor learning, totaling 20 samples through random sampling technique by drawing lots, after the pretest was carried out.

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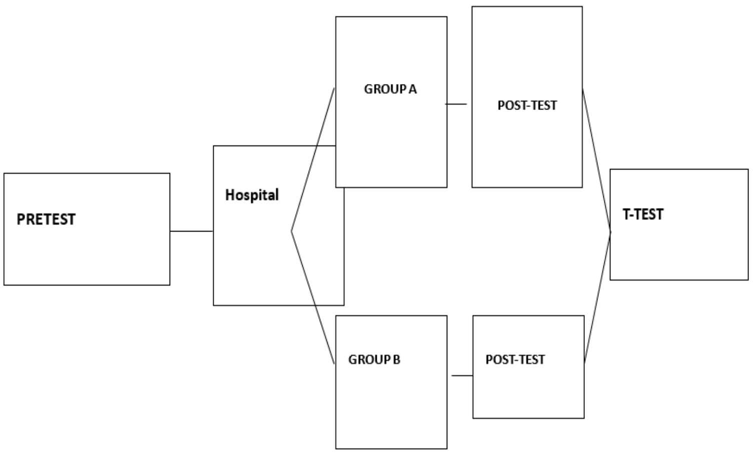

Figure 1: Research Design

The sample in this study was voluntary and had nothing to do with the learning process because it was done after school hours were over. The teaching staff is tasked with assisting researchers in directing students, so that the entire course of the research process is the responsibility of the researcher. During the research, Group A conducted Plyometric Exercises Based on the OPTIMAL theory of motor learning. Group B was not given treatment and only underwent pretest and posttest. Variation of climbing and descending stairs is carried out 16 times (three meetings a week) on Mondays, Wednesdays and Fridays, using a load that continues to increase at each meeting, and then descends before carrying out the posttest.

The instrument used is the Long Jump Test, the equipment prepared is a Roll meter, test blanks, and writing instruments. In its implementation, the results recorder, result meter and jump guide are prepared. The technical implementation starts from the testee placing himself on the starting line, the testee getting ready to then run from the starting line to the sandbox with a long jump, the jump is measured when the testee refuses (takes off) either from the pedestal or running track (both are allowed) to the fall of the foot in the tub of the jump that is farthest from the place of rejection. The attitude of the body in the air can use squat style, hanging style and air gait, landing using both feet. Students have the opportunity to try 3 times, the best results are then recorded.

Before testing the hypothesis, the Liliefors test was used to test whether the data was normally distributed and the Bartllet test was used to test homogeneity. Then an effect test (t-test) was carried out with the help of the Statistical Product and Service Solutions (SPSS) application version 22.

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RESULTS AND DISCUSSION

The data normality test and variance homogeneity test are needed before testing the hypothesis, to state whether the data comes from a normally distributed population or not by comparing the Sig coefficients. Or a P-value of 0.05 (significance level). If the P-value is greater than 0.05 (significance level), which means it is not significant, it means that the data comes from a normally distributed population, and vice versa. The normality test results are described as follows:

Table 1: Summary of Long Jump Ability Normality Test for All Sample Groups

No.	Group	N	P-values	Conclusion
1.	Exercise Group (Group A)	20	0.082	Normal
2.	Control Group (Group B)	20	0.113	Normal

The results of the analysis of the normality test for the results of the long jump in the training group (Group A) showed that the P-value was > 0.05, namely 0.082 > 0.05, which means that the sample came from a normally distributed population. As well as the results of the analysis of the normality test for the long jump in the control group (Group B) showed that the P-value was > 0.05, namely 0.113 > 0.05, which means that the sample came from a normally distributed population.

The second prerequisite test is the homogeneity test, to determine whether the variance of the groups being compared is homogeneous by looking at the magnitude of the P-value coefficient. If the analysis shows that the magnitude of the P-value coefficient is greater than 0.05, which means it is not significant, it means that the variances of the two groups being compared are homogeneous. Conversely, if the analysis shows that the magnitude of the P-value coefficient is less than 0.05, which means it is significant, it means that the variances of the two groups being compared are not homogeneous.

Table 2: Summary of the Long Jump Ability Homogeneity Test for All Sample Groups

Variance	N	F	P-values	Conclusion
Group practice (Group A) and Control group (Group B)	40	3,608	0.065	Normal

The results of the analysis of the homogeneity test of variance for the training group (Group A) and the control group (Group B), obtained a P-value = 0.065. Because the P-value is > 0.05, it can be concluded that there is no difference in variance between groups of data compared to other words, the variance of the data is the same (homogeneous). Based on the results of the requirement test that the two groups are normally distributed and the variance of the data is the same (homogeneous), then proceed with an inferential test or hypothesis test.

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Table 3: The results of the paired effect test between the pretest (pretest) and posttest (posttest) training group

Group	Variable	Means	t-count	Df	Sig	α
Exercise Group (Group A)	Pretest Postest	-3.350000	-8,257	19	0.000	0.05

Data obtained from the results of the paired sample T test between the initial test (pretest) and the final test (posttest) of the training group (Group A) on the increase in long jump results, namely the t-count value of -8.257 > t-table of 2.093, while the value of Sig .000 <α 0.05 means there is a significant difference between the pretest (before treatment) and posttest (after treatment).

Table 4: The results of the unpaired influence test posttest the training group and the control group

Variable	t-count	Df	Sig (2-tailed)	α
*Postest*up training group (Group A) and Posttest control group (Group B)	2,728	39	0.010	0.05

Data from the results of the independent sample t test were obtained between the final test (posttest) of the training group (Group A) and the control group (Group B), namely the t-count value of 2.728 > t-table of 2.022, while the Sig value (2-tailed) 0.010 <α 0.05, so there is a significant difference between the posttest (after treatment) given to the training group (Group A) and the control group in increasing long jump results.

Of course, it is not excessive if plyometric training will affect the results of a person's long jump performance, considering that this exercise has traditionally been used as a long jump training treatment, and its benefits are increasing explosive performance, strength, endurance, flexibility, agility of leg muscles. The sporting world's recognition of plyometric training as a useful treatment for increasing explosive power comes primarily from the Russian and Eastern European successes in athletics in the mid-1960s.(Nurdiansyah & Susilawati, 2018). Plyometric exercises are exercises that form explosive movements, train muscle strength, muscle endurance, flexibility, agility.(Adhitya Bagaskara, 2019). The main scope of plyometric training is training running speed (prefix) and support before jumping(Tai et al., 2016). For this reason, the results we obtained are in line with previous research which also used plyometric training to improve the results of long jump performance(Yatindra et al., 2017),(Sartono, 2017),(Yukarda et al., 2019),(Oktaviani et al., 2019),(Sobarna et al., 2019),(Izzullaq et al., 2022).

The performance of this plyometric exercise is also strengthened by the application of a training atmosphere based on The OPTIMAL theory of motor learning.

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Table 5: Illustration of Plyometric Exercise Based on The OPTIMAL theory of motor learning

Sequence of activities	Activity	function
1.	Briefing during, marching and praying (5 minutes)	Preparation
2.	Warm-up (10 minutes)	Preparation
3.	plyometric exercises; number of repetitions 3, sets 3, interval between reps (1 minute), (total 20 minutes).	Core activities
a.	*autonomy support*(US); "Come on! Who wants to experience 3 reps of plyometrics, done at the start of each set or during the interval.	Core activities
b.	*enhanced expectations*(EE); good criticism "come on! The movements have been made even more precise", changing the task difficulty "come on! If you feel tired it means there will be an increase", the conception of ability "come on! Everything is possible, nothing is impossible if you try and be enthusiastic in completing the training session".	Core activities
c.	*external focus of attention*(EF); "Come on! Don't be afraid of the wrong movement, pay attention to the coach/friend's footsteps (which have been previously appointed by the coach)".	Core activities
4.	Cool down (5 minutes)	Closing

Based on table 5, it is clear that during the plyometric training session the external focus of attention (EF), enhanced expectancies (EE), and autonomy support (AS) are always optimized. The implementation of the autonomy support (AS) element in carrying out a training session makes a person feel that they are not forced to undergo training and even makes them curious about what they will get during the training session. The motor learning process that seeks to give freedom to children is very significant for improving a child's motor learning performance (Sanli, Patterson, Bray, & Lee, 2013), (Wulf, 2007). Conditions that provide opportunities for children to choose to participate may give birth to motivation, because they will try to complete the training (learning) session they will be working on. (Wulf & Lewthwaite, 2016). Table 5 also very clearly illustrates the existence of enhanced expectancies (EE) reinforcement, even outlined in three moments, namely good criticism, changing task difficulty, and conception ability. Expectations produce manifestations in the form of increasing one's motivation in trying to fulfill their needs and desires(Schmidt, Braun, Wager, & Shohamy, 2014). Practically Table 5 also very clearly illustrates the strengthening of the external focus of attention (EF). With regard to the external focus of attention (EF) it is certainly very clear that it will be able to influence the desired movement results, considering that the important elements in producing maximum movements such as balance and accuracy have been scientifically proven to be strengthened through training using tools that will strengthen external focus of attention (EF). To practice balance, many exercises use signs and symbols, as well as to improve accuracy. Practicing shooting basketball using the hoop as the target center, smashing volleyball accuracy requires a predetermined field as the point where the ball falls, practicing your baseball hitting accuracy requires the ball being thrown repeatedly.

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CONCLUSION

Based on the research results it can be concluded that; 1) there is a significant difference between the pretest and posttest of the OPTIMAL theory of motor learning-based plyometric exercise group. 2) There is a significant difference between the posttest (after treatment) Plyometric Exercise Based on The OPTIMAL theory of motor learning and the control group in increasing long jump results. This increase is the result of an increase in physical components after doing plyometric exercises. Plyometric Training Based on The OPTIMAL theory of motor learning is also believed to optimize motor performance by maximizing intrinsic motivation and attention to learning/practicing.

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