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The Effectiveness of Imagery Exercise on Improving the Technical Skill of a Basketball Lay-Up

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The purpose of this study is to determine the effectiveness of imagery training on improving the technical skill of a basketball lay-up for students of Faculty of Sports Education, Yogyakarta State University (FIK UNY). The method used in this research was an experimental design with pre-test post-test control group. The population of this study was the new students of FIK UNY academic year 2013/2014. Samples were taken using the proportional random sampling technique. To prove the research hypothesis, a t-test statistical technique was used. Based on the analysis of data, t_{count} was 2.177 with $p < .05$. This means that there is a significant difference in the lay-up technical skill between the control group and the experimental group. The experimental group had a higher mean score of improvement in lay-up technical skill compared to the control group. Thus it can be concluded that imagery exercise improves the basketball lay-up technical skill for students of FIK UNY. The result in basketball lay-up of students who were given the exercise program and the imagery exercise is significantly higher than the students who were given a lay-up shot exercise program without imagery exercise.

Keywords: imagery exercise, lay-up, basketball, students

Penelitian ini bertujuan untuk mengetahui efektivitas latihan imajeri terhadap peningkatan keterampilan teknik lay-up shoot Bolabasket mahasiswa FIK UNY. Metode yang digunakan dalam penelitian ini adalah desain eksperimen dengan teknik *pretest-posttest control group design*. Poluasi dalam penelitian ini adalah mahasiswa baru FIK UNY tahun akademik 2013/2014. Teknik pengambilan sampel menggunakan *proportional random sampling*. Teknik analisis data untuk membuktikan hipotesis penelitian menggunakan statistik uji t. Berdasarkan hasil analisis data diperoleh t_{hitung} 2,177 dengan $p < .05$. Ini berarti terdapat perbedaan yang signifikan keterampilan teknik lay-up shoot antara kelompok kontrol dengan kelompok eksperimen. Kelompok eksperimen memiliki rerata peningkatan keterampilan teknik lay-up shoot yang lebih tinggi dibandingkan kelompok kontrol. Penelitian ini menyimpulkan bahwa latihan imajeri memiliki efektivitas terhadap peningkatan keterampilan teknik *lay-up* shoot Bolabasket mahasiswa FIK UNY. Peningkatan teknik lay-up shoot Bolabasket pada mahasiswa yang diberi program latihan lay-up shoot ditambah latihan imajeri lebih tinggi dibandingkan dengan mahasiswa yang diberi program latihan lay-up shoot tanpa ditambah latihan imajeri.

Kata kunci: latihan imajeri, *lay-up shoot*, bolabasket, mahasiswa

UNY FIK (Sports Education Faculty) is known to admit students who came from remote regions outside the city Yogyakarta, mainly from the numerous outlying villages' high schools. Given the background, it is common for the students to have high skills in regional sports such as football, volleyball, and badminton. Yet, it is also true that they lack proficiency in sports that develop in more urban regions, such as softball, swimming, and basketball. According to the curriculum of UNY FIK, students are expected to be proficient and master all of the formerly mentioned sports. Understanding their background, it is difficult for them to learn sports they have never done before, such as basketball. Having studied basketball in college for 12 years, the authors understand the situation. Generally, the students find it hard to learn basketball, especially learning the complicated techniques such as a shooting a lay-up.

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According to Oliver (2003) a lay-up is a technique to shoot the ball inside the basket in basketball game. In essence, this technique is trained by dribbling the ball from the free throw line of the court, and then leaping with one leg and on the second leap, an attempt to shoot the ball to the ring is done simultaneously while leaping. At the first leap, the ball is carried by two hands, on the second leap, the ball is shot on to the ring using only one hand. A lay-up shot is done by having the ball deflecting from the upper part of the ring into the basket, or by shooting it straight to the ring.

Although the ability to execute a proper lay-up is one of the main indicators of one's proficiency in basketball, the records and teaching experience show that less than 10% of all students properly mastered the technique of lay-up each year. (Sumiarsono, 2002)

Considering how vital it is to master the technique of lay-up in basketball, it is necessary to develop an approach to increase the skill of students in this complex technique. Numerous psychological studies aimed to increase the skill of doing a complex movement have been done; one example is the imagery exercise. David Beckham's ability in executing the banana kick with dead-eye accuracy is a result of an imagery exercise. (Cale & Forzoni; 2004).

The question is how can imagery exercise increase one's skill in doing complex moves in sport? Research done by Kosslyn, Ganis, & Thompson (2001) on brain nerve functions found that, during mental exercise, the same neuromotor pathway used in specific physical acts is activated as well. The motoric program in the motoric cortex, which is responsible for movement, is reinforced as a result of the activation of the main neural pathway during mental imagery exercise. The result shows that mental imagery may help in developing motoric skill by increasing coordination pattern and by priming the appropriate motor neuron of the muscles that are needed to perform specific motoric tasks. According to Halgren, Dale, Sereno, & Tootell (1999) mental exercises activates peripheral activity, which passes afferent information to the motoric cortex that has a function to strengthen the motoric program. Furthermore, through the advancement of *neuroimaging* technology, researchers are able to test many theories on imagery. Researchers have taken steps to show that mental imagery combines the same nerve mechanism that is used on memory, emotion, and motor control. The main motor cortex, which is a part of the frontal lobe, works in relation with pre-motoric regions to plan and execute movements. Many researchers have also shown that the cortex area, which is activated in controlled movement, also plays part in imagery. (Klein, Paradis, Poline, Kosslyn, & LeBihan; 2000).

In practice, many other examples have imagery exercises as a media to increase skill in various complex sport techniques. Many literatures also explain that athletes that possess the ability to use imagery will receive many benefits and skills compared to athletes who do not utilize imagery exercises (Isaac 1992). Hall (2001) states that, imagery is a media that has been proven effective to increase performance in sports. According to Smith, Collins & Holmes (2007) however, relying solely on imagery is considered not enough to produce a desired effect in sports performance.

Martin, Moritz & Hall (1999), state that a special model of practical imagery application for increasing sports performance needs to be developed. According to Hardy, Jones & Gould (1996), athletes who spontaneously use unstructured imagery exercise to achieve a specific goal, found it difficult verbalize the details of the imagery exercise fundamentals. Mental imaging is not merely an individual spontaneity, imagining a particular performance. Holmes and Collins (2001) state that presently, most sport practitioners have used mental imagery that visualizes structured technical mental exercises to create an optimal sport performance.

Taylor & Wilson (2005) state that the power of imagery lays in its utilization as a structured program that combines written and audio scripts. This program is designed to handle certain sport technique that focuses on increasing the athlete's performance. Guillot & Collet (2008) state that the imagery exercises script, i.e. the instructions and how the coach communicates them, determines the success of the program. According to Taylor & Wilson (2005), the scripts are designed with detailed scenarios, highlighting physical settings in a competitive context, special performance, as well as other specific targeted aspects. As an example, research by Bell, Skinner, & Fisher (2009) used scripts to guide the imagery exercises of three golf players, and later found an effective result in placing the ball on the target.

According to the above-mentioned theory, it is safe to say that imagery exercise is one of the most effective methods of training athletes, including students wanting to master the technique of lay-up in basketball. Through this imagery exercise, a player will train himself by imagining the technique in his mind, placing every motion to the limbs used to perform the motion. Hence the nerves used for that

particular limb/s would be accustomed to the technique trained in his mind. Consequently, when the time comes to practice the technique in real life, the athlete will find it easier.

Referring to the theoretical dissection mentioned above, a hypothesis is proposed: "imagery exercise is effective for increasing technical skill of lay-up in basketball." Imagery model would be structured and made appropriate with the lay-up shooting technique in basketball. The precision and accuracy of an imagery exercise model is expected to prove the hypothesis of the research. Based on the background and the hypothesis, the issue of the research can be summarized as: Is imagery exercise effective for increasing technical skill in basketball lay-up?

Method

The aim of this research is to discover the effectiveness of imagery exercise to increase technical skill in a basketball lay-up of FIK UNY students. To achieve the goal of this research, the method of experimental research is used, a method usually used to discover the influence of certain behaviors in a controlled condition (Creswell, 2008). The design of this research also uses the "pre-test – post-test control group design". The design of this research is visualized in Figure 1.

Population and Research Sample

The research population is male students of FIK UNY of year 2013/2014 who attend Basketball Movement Fundamentals class. The program is made up of three Study Program classes of Physical Health and Recreation, two Study Program classes of Sports Coaching and lastly, a class of Sports Science; all totaling to 184 students. The technique of sample gathering in this research utilizes *proportional random sampling.* According to the sample technique, 30 people, consisting of: 15 male students of Physical Health and Recreation classes; ten male students of Sports Coaching classes; and five male students of Sport Science class. All of the samples are then given a *pre-test* to decide the experimental group and the control group. The Test used is a lay-up test from Sodikun (1992). After the *pre-test* sample is done, the scores of the *pre-test* are ranked, and then an experimental and controlled group is created, using *ordinal pairing* (Sugiono, 2010).

He further explained the steps of creating a group using ordinal pairing as follows: (1) Making a list appropriate to the amount of subject being researched, along with their numberings; (2) Samples were ranked according to their pre-test scores, starting from 1st ranking to 30th ranking; (3) Every subject (Subjects from number 1-30) took a lottery to determine whether he would be in the odd number team, or the even number team; (4) Subjects with the even number were placed in the experimental group and the odd number group were placed in the controlled group, with each group consisting of 15 students. This process assures that this research design will produce a high external validity (Nasir, 2009; Berg & Lation, 2008)

Research Variable

The free variable is the lay-up shot imagery exercise. The imagery exercise is a motion visualization exercise of lay-up techniques. In this context, the lay-up exercise

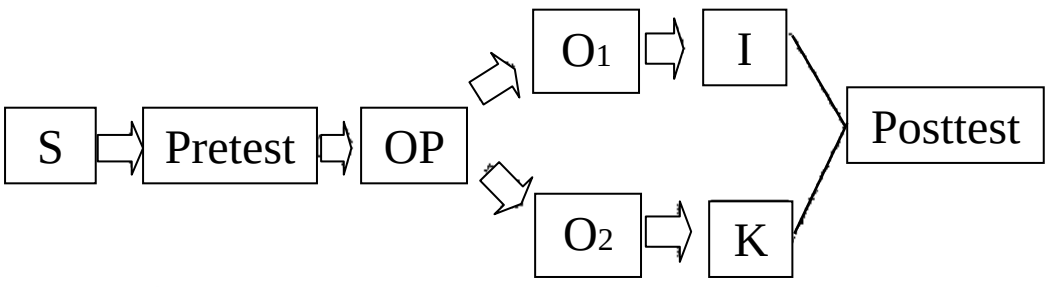

Figure 1. Research design (Sugiono, 2010: p. 112)

Note. S: Research sample; OP: Ordinal pairing; O_1: Experimental group; O_2: Controlled group; Pretest: First test; I: Lay-up shooting training with imagery exercise; K: Lay-up shooting training without imagery exercise; Posttest: Final test

is a *treatment* that integrates imagery exercise. The lay-up imagery exercise took reference and developed from the imagery exercise program made by Robin S Valey & Susan M. Walter (Williams, 1993), and had been tested. In practice, this free variable is strictly conditioned and controlled. This method is expected to achieve a high internal validity.

This imagery lay-up exercise is done six times with 30-40 minutes core training for each time. There are with few positions changes as per the step by step guidelines designed in imagery exercise as follows.

Stages of training. It includes the setting of pre lay-up position, slow motion lay-up, focusing on stepping rhythm, and the execution of a lay-up using the whole true movement, is followed by reinforcing the visualization of the motions every time a lay-up is about to be done.

Imagery exercise using the trigger words. Guided by the researchers, the students are made to sit and relax before doing the imagery exercise. Students are then ordered to imagine and memorize the motions of a lay-up that had been done in the first stage of this exercise. Examples of trigger words are as follows, "step your leg and leap as far as you can to the front…", "Step shortly…", "Leap vertically as high as possible…", and "Reach out the arm that has the ball…"

Physical exercise using the trigger words. Students are instructed to do a lay-up exercise using trigger words that have been previously taught.

The bound variable is the technical skill of lay-up. A test developed by Sodikun (1992) was used to assess the technical skill of lay-up. To avoid any overlap between the treatment and the success measurement, a replication of the test developed by Sodikun is done. This method was first tested before being used in this research. In addition, the researchers have also done a randomization by placing the subject in the controlled and experimental groups. The randomization is done to increase the validity of research result.

The lay-up test developed by Sodikun (1992) has a test validity of .509 and test reliability of .675. Unfortunately, Sodikun did not give further explanation regarding the statistical information. As the result, there are still some confusion regarding the completeness and clarity of information surrounding the validity and reliability of the measurement results. The following explanations are the authors' interpretation of the information provided by Sodikun. Validity is the correlation of exercise result (treatment) with measurement indicator. On the other hand, reliability is the correlation of result within the result of the exercise itself, without comparing it with the end measurement result. The obscurity of statistical information on Sodikun's work is compensated using empirical observation on volunteers during the testing period. Data from Sodikun's research and empirical findings during the testing confirms that the procedure used is deemed sufficient. The procedure of the testing is as follows: (1) Subject stands on the middle right side of the court, facing the basket, while holding the ball on the right side of the body; (2) Subject dribbles the ball to the basket and a lay-up is done; (3) Subject is given eight chances to do a lay-up but is allowed to have one trial shot before the official count. (4) Scores are considered official if the lay-up steps are correct and the ball enters the ring. The more points the subject makes, the better his lay-up skill is.

Method and Data Gathering Technique

Imagery exercise lay-up shot. After splitting into two groups, the research began by giving the experimental group imagery exercises. Examples of script used include instructions for the subjects to sit and relax, regulate breathing, observe the basket, do a lay-up pose, and imagine the ball smoothly entering the basket. This imagery exercise script was first tested on ten extracurricular basketball players of the State Senior High School 1, Bantul (SMAN 1 Bantul). Testing results showed that imagery exercise script was considered sufficient to be used.

The execution of the research was started with warm ups, similar to how a normal exercise session would start. The group circled the court eight times, followed by a dynamic warm up. This was done both on the controlled and the experimental groups. The experimental group practiced on Monday–Wednesday, while the controlled group practiced on Tuesday–Friday. The experimental group was given an imagery exercise guided by the researcher before a core lay-up shooting exercise began. The controlled group on the other hand, went straight to the core exercise without the imagery exercise.

Data collection technique of lay-up shot. The technique of data collection was through tests. The test used was the lay-up shot test by Sodikun (1992). This test was done twice, during the pre-test and the post-test. The steps on the lay-up shot test are as mentioned above.

Data Analysis Technique

The data analysis technique used was the inferential statistic T-test analysis (*paired t-test).* In order to prove

the truth of the conclusion, a condition test on normality calculation using the *kolmogorov smirnov*, categorial calculation using SPPS 13 program, and a homogeneity test using the F-test were done before the data analysis. The calculation of data to accept and decline hypothesis on the significance scale of 5% was done through the SPPS 13 program. The steps from each analysis are as follows:

Conditional Testing Part I: Normality Test. Normality test was done to find out whether or not the data was normal. The testing depends on the variables that are to be processed. Normality testing of the datasheets uses the *Kolmogorov-Smirnov Test* with the help of SPPS 13. If all the data from all variables has a *p value (Sig.)* > .05, then all variables are distributed normally. The results of the normality test can be seen in the appendix.

Conditional Testing Part II: Homogeneity Test. The homogeneity test is needed to ensure that groups that made up the samples are from a homogeneous population. Homogeneity is found using the F test from the *pre-test* and *post-test* data using SPSS 13 program. The variant is considered homogeneous if *p (Sig.)* > .05.

Hypothesis Test. T-test was done to test hypothesis using SPSS 13 program. The test compares the mean between group one and group two. The significance rate used is 5%. If the value of tcount is smaller than ttable, then Ha is rejected, if tcount is bigger than ttable, then Ha is accepted. Or if a $p < .05$ is achieved then Ha is accepted; and vice versa if $p < .05$ then Ha is rejected.

Results

Data Description

The descriptive analysis of the data is summarized in Table 1. According to Table 1, a histogram of the average score achievement was made and is presented in Figure 2.

According to the computer generated data analysis results on the mastery of basketball lay-up technique, on the early data the students in the experimental group have an average (mean) score of 2.27 and a deviation standard of 1.740. While on the final data (post-test) the same group has an average (mean) of 5.53; and a deviation standard of 1.246. Data analysis result on the controlled group, achieved a pre test average (mean) of 2.40 and a deviation standard of 1.724. The end data (post-test) of the same group, achieved a mean score of 4.20 and a deviation standard of 1.897.

Table 1
Descriptive Statistics of Data on the Proficiency of Basketball Lay-Up Shot Technique

Statistic	Pre-test		Post-test	
	Experimental	Controlled	Experimental	Controlled
Mean (Averages)	2.27	2.40	5.53	4.20
Deviation standard	1.740	1.724	1.246	1.897
Variants	2.924	2.971	1.552	3.600
Range	5	5	5	6
Minimum	0	0	3	1
Maximum	5	5	8	7

Legend. Experimental group: Lay-up exercise program with imagery exercise; Controlled group: Lay-up exercise program without imagery exercise.

Table 2
Data Results of the Normality Spread Test on the Proficiency of Lay-up Shot in Basketball

Data		Kolmogorov-Smirnov		Information
		Statistics	p	
Total data	Pre-test	.832	.494	Normal
	Post-test	.900	.393	Normal
	Increase	.637	.812	Normal
Experimental group data	Pre-test	.627	.826	Normal
	Post-test	.778	.580	Normal
	Increase	.728	.665	Normal
Experimental group data	Pre-test	.742	.640	Normal
	Post-test	.627	.826	Normal
	Increase	.710	.695	Normal

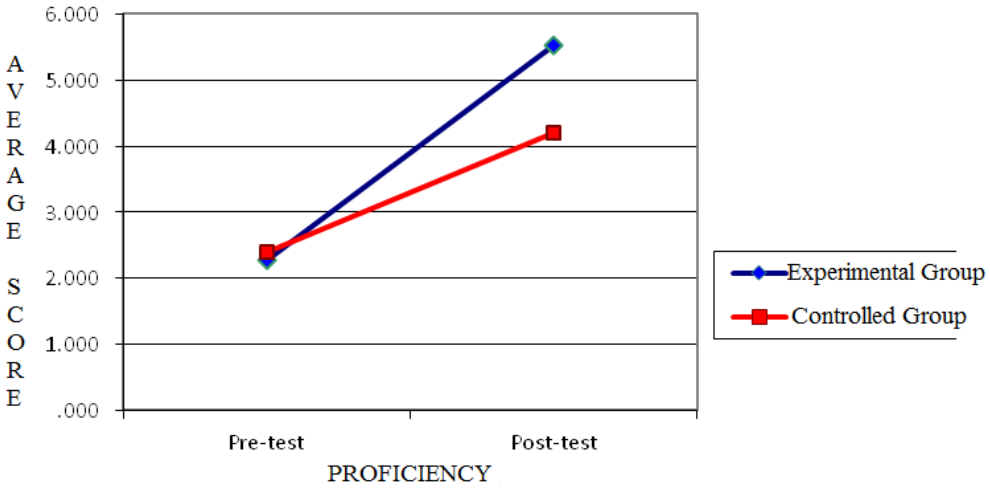

Figure 2. Histogram of the average basketball lay-up score achievement.

Conditional Analysis Testing

The hypothesis testing on this research uses the T-test between groups (Independent t-test) and the paired t-test. The conditions that must be fulfilled before doing t-test are: (1) a normally distributed data that is tested using normality test spread; and (2) variance (SD^2) between each homogenous group tested using the one way homogeneity variance test.

Normality Spread Test

Testing on data's normality spread uses the *kolmogorov-smirnov test* that is done using the help of SPPS *software*. The analysis results are concluded on the following table.

Table 2 shows that the normality test on the data of proficiency in Basketball's lay-up shot technique of all the groups, data on the experimental group, and data on the contol group; be it the pre-test, post-test, and even the improvement showing Kolmogorov-Smirnom (KS) with $p > .05$; as a result, all data in this research are considered normally distributed.

Variance Homogenity Test

Variance Homogeneity testing is meant to discover whether or not samples taken from the population came from the same variant and does not show any significant difference between one and the others. The statistics test used in this research is the F test (*Levene's Test for Equality of Variances).* The brief result of the analysis is presented on Table 3.

According to Table 3, it is found that all Fcount is not significant, with a significance rate of 5%; shown as > .05. Given $P > .05$, then it is concluded that there are no difference between variants of all data. The data on the proficiency of Basketball's lay-up shot technique, including the pre-test, post-test, and the improvement data are considered homogenous. Having said that, the conditions for variance homogeneity have been fulfilled.

From both conditions of testing discussed above, all conditions for analysis, which are: normally distributed data and variants between homogenous group, have been fulfilled. Hence, the paired t-test and independent t-test analysis may proceed.

Hypothesis Testing

Hypothesis tested in this research is: "imagery exercise is not effective to increase the lay-up technical skill in basketball." This hypothesis is zero hypothesis (Ho); whilst the alternative hypothesis (Ha) is "imagery exercise is effective to increase lay-up technical skill in basketball." This hypothesis testing is used to group cross testing (independent t-test) and repeat t-test (paired t-test).

Independent *t*-Test

The results of the independent t-test using SPPS *software* are indicated on Table 4. The analysis result from Table 4 can be described as follows:

The analysis result on lay-up technical skill before tampering (pre-test), found that *tcount* = .203 with >

.05, making it insignificant. This proves that before tampering on both groups, they are balanced and had no significant differences.

The analysis result on lay-up technical skill after tampering shows a, tcount of 2.275 with $p < .05$, making it significant. This proves that after tampering, there is a significant difference. From the perspective of the averages, the experimental group scores higher than the controlled group.

Analysis on data of lay-up technical skill improvement, found a tcount of 2.177 with $p < .05$, making it significant. This proves that there are significant improvements. From the improvement rate's perspective, the experimental group scored higher in improvement compared to the controlled group.

Paired *t*-Test

Analysis result of the paired t test on the data of the experimental group (tampered by imagery), and the controlled group (without imagery tampering) using the help of SPSS *software* is summarized on Table 5 and Table 6.

Table 5 shows that according to the analysis results, a tcount with $p = .000$; and $p < .05$, making t tcount significant. This means that there is a significant difference in lay-up technical skill after the exercises (post-test) compared to before the exercises was done (pre-test) on groups of students given exercises using imagery. Seen from the averages found, data on the *post-test* was higher compared to the *pre-test*, this means that the results are positive.

Table 3
Results of Inter-Groups Homogeneity Variance Testing

Lay-up Shot Technique Proficiency Data	Le Levene's test for equality of variances		Conclusion
	F	*p* (sig.)	
Pre-test	.118	.734	Homogenous
Post-test	3.667	.066	Homogenous
Improvement	1.242	.275	Homogenous

Table 4
Analysis Results of Independent t-test on The Basketball's Lay-up Shot Technical Proficiency Data

	Groups	Averages	*SD*	Statistics	
				T_{count}	*P*
Pre pre-test	Experiment	2.27	1.710	- .213	.833
	Control	2.40	1.724		
Post post-test	Experiment	5.53	1.246	2.275	.031
	Control	4.20	1.897		
Increase	Experiment	3.27	1.580	2.177	.038

Table 5
Analysis Result of Paired t test on The Data of Basketball's Lay-up Shot Technical skill of The Experimental Group

Experimental group data	Averages	*SD*	Statistics		Information
			T_{count}	*p-Value*	
Post-test	5.53	1.246	8.009	.000	Significant
Pre-test	2.27	1.710			

Table 6
Analysis Result of The Paired t test On The Basketball's Lay-up Technical Skill Data of The Controlled Group

Controlled group data	Averages	*SD*	Statistics		Information
			T_{count}	*p-Value*	
Post-test	4.20	1.897	3.749	.002	Significant
Pre-test	2.40	1.724			

Table 6 shows that based on the analysis result, a tcount of 3.749 with $p = .002$; and on $p < .05$ shows that the tcount is considered significant. This means that there are significant differences in the proficiency of Basketball's lay-up after the exercises (post-test) compared to before the exercises (pre-test) on group of students that were not given imagery exercises. Based on the averages, the post-test data were higher compared to the pre-test data, meaning that the influence is positive. This proves that after tampering (exercises), there is a significant difference. Based on the averages, the result scores of pre-test and post-test of the experimental group was higher than the controlled group. Nonetheless, the data analysis result shows that either lay-up shot exercises with or without imagery exercises are effective in improving lay-up technical skill. This means that although the imagery lay-up training gives a better result ad effect, both exercises are effective in improving the skill. Based on that fact, then the zero hypothesis (Ho) that states, "Imagery exercise is not effective to improve lay-up technical skill in basketball" is rejected; and the alternative hypothesis that states, "Imagery exercise is effective for improving lay-up technical skill in basketball" is accepted.

Discussion

This research shows that both lay-up trainings given to the controlled and the experimental group are both effective. In other words, both lay-up trainings statistically give significant improvement. But lay-up training that includes imagery exercises is proven to be more effective to improve lay-up technical skills of FIK UNY students. This result is proven by the analysis result on the post-test data with t_{count} of 2.275 and $p < .05$ (significant). With this result, it is fair to say that there is a significant difference in post-test and significant improvement in lay-up technical skills of students having lay-up training program with imagery exercises compared to students having lay-up training program without imagery exercises.

The data analysis of students before and after having lay-up shot program with imagery exercises, nets a t_{count} of 8.009 and $p = .000$ (significant). This proves that there are significant improvements in basketball lay-up technique.

Technical improvement of lay-up in students who had the lay-up training program with imagery exercises is higher compared to the students who had lay-up shot training without imagery exercises. The improvement of students who had the lay-up training program with imagery exercises were up to 3.27; while the students who had the program without imagery exercises only improved to 1.80. This research states that a structured lay-up shooting training supplemented by imagery exercises may improve lay-up technical skills more effectively.

Many recent literatures have stated that most sport practitioners have used mental imagery exercise that illustrates structured mental exercise technique to create an optimal sport performance (Holmes & Collins; 2001). According to Hardy, etc (1996), athletes usually utilize a non-structured imagery training that is done spontaneously to achieve a specific goal. The athletes found it hard to get the script of the imagery exercises. Taylor & Wilson (2005) states that before an athlete starts an imagery session, scripts are to be designed with detailed scenarios that highlight a physical setting in a specific performance context with other specific focused aspects. He further explained that the power of imagery lies on its structured program that combines written and audio scripts designed to handle a specific sport technique. This will enable the athlete to improve his or her performance.

The research done by Bell, and friends (2009) proves that the use of scripts to guide the imagery exercises of three golf players have given an effective result. There are many other theoretical studies that are consistent with this research. This research has proven that structured imagery exercises supplementing basketball lay-up training may improve the lay-up technical skill of FIK UNY students. Thus this research had strengthened the theory which states that a structured imagery exercise may increase the effectiveness of learning a sport technique, enabling an athlete to achieve optimum accomplishment.

Conclusion

This research gives valuable information to researchers, athletes, and especially practitioners of sports such as Physical Education (PE) teachers and amateur coaches, that imagery exercise is effective to increase technical skill in sport. Although the practice hasn't been structured and made as an integral part of a training program, currently these imagery exercises have been applied by elite sport coaches and athletes privately in the field. Many academic facts recommend that combining structured and integrated imagery

exercise into the training program may increase athlete's performance. In this context, it is important to note that the coach plays an important part in integrating imagery exercises into the sport training program. The finding of this research shows that imagery exercises given on lay-up training are more effective in improving the technical skill of a complex sport. With its limitations, this research's result is hoped to be used as a valued model for future researchers studying the potential mechanism of psychological aspect of imagery exercises to help improve the performance of athletes.

It is important to note the lack of information of the validity and reliability of Sodikun's measurement result (1992). Statistical data is a valuable contribution to empirical data. Unfortunately, the obscurity of information has the potential to cause misunderstanding and difference in interpretation. One of the examples of the obscurity was why a correlation test was done instead of a difference test (i.e. a t-test). The lack of explanation makes the authors choose not to continue with the statistics model testing done by Sodikun, and instead changed it with the difference test, which is considered to be more accurate and useful. Provided that it is more appropriately in line with the goal of the research, which is testing the effectiveness of the treatment.

Nonetheless, the authors realizes that correlation testing also has its benefits in giving a complete picture regarding the process of the treatment and the final measurement. Other consideration not to do a correlation test was the lack of complete data. The data only recorded the final score; it did not record whether or not a lay-up was successful at every chance given to each participant. This became one of the weaknesses of this research, which can be easily fixed and avoided by the next researchers.

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