Panorama Florentius Ferri Persada, Sugiyanto, Doewes Muchsin. The development of play-based physical training to improve physical fitness of the soccer players in the 10-12 years age group. Journal of Education, Health and Sport. 2018;8(11):173-184. eISNN 2391-8306. DOI http://dx.doi.org/10.5281/zenodo.1477507
http://ojs.ukw.edu.pl/index.phpohs/article/view/6274

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26/01/2017).
1223 Journal of Education, Health and Sport eISSN 2391-8306 7

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 15.10.2018. Revised: 25.10.2018. Accepted: 04.11.2018.

The development of play-based physical training to improve physical fitness of the soccer players in the 10-12 years age group

[1]Florentius Ferri Persada Panorama, [2]Sugiyanto, [2]Muchsin Doewes

[1]Masters Program in Sport Science, Universitas Sebelas Maret, Surakarta, Indonesia
[2]Departement of Sport Science, Postgarduate Program, Universitas Sebelas Maret, Surakarta, Indonesia
ferripersada@gmail.com, sugiyantoprobo@gmail.com, mdoewes2000@yahoo.com

ABSTRACT

The background of the research is the needs of physical training design which is suitable with the characteristics of the soccer school players in the 10-12 years age group in Yogyakarta. Based on this problem, this study aims to improve the physical fitness of the soccer school players in the 10-12 years age group in Yogyakarta by applying the play-based physical training design. The research method used in this study is the "developmental research method (Research and Development)" proposed by Borg and Gall. The researcher adapted the research procedures into three main stages: 1. needs analysis, 2. product's development and product's testing, and 3. product's effectiveness testing. The first stage is a needs analysis which was conducted by interviewing the soccer coaches. It is found out that the most applied physical training design is the conventional one and is unfortunately less effective for the children because it does not go in accordance to the their age's characteristics. The second stage is developing the product by means of the experts' testing

and evaluation resulting in 88,19% and is ready for the next product's testing. The small group test result came in 83,28%, while the bigger group test resulted in 87,25%. The third stage is product's effectiveness testing by comparing the groups given the play-based physical training design and the conventional one using the pre-test and post-test research designs. The range obtained from the physical fitness pre-test and post-test as follows: (1) body composition: experiment group of 0,12 and controlled group of 0,17, (2) strength: experiment group of 4,53 and controlled group of 3,17, (3) muscle endurance: experiment group of 2,53 and controlled group of 1,53, (4) flexibility: experiment group of 0,83 and controlled group of 0,4, (5) cardio respiratory endurance: experiment group of 1,61 and controlled group of 1,2. To conclude, the play-based physical training design significantly improves the physical fitness of the soccer school player in the 10-12 years age group in Yogyakarta. It is quite important to note that the final product of play-based physical training design comes in the form of a guidebook.

Key words: Physical Fitness, Play-based Physical Training, Developmental Research

INTRODUCTION

Soccer develops over time. Science and technology become the significant factors in soccer development. Soccer is very popular sport seen from the public's high interest toward the sport. In general, soccer is a team play that uses a foot ball. Soccer is played on the grass or synthetic fields with the length of 100-120 meters and the width of 60-90 meters. Soccer is played by two teams facing each other with the number of players in each team are 11 people and play in 2 x 45 minutes long. The aim of the game is to goal in the ball to the opponent's goal post as many as possible, while trying to defend the team from the opponent's attacks at the same time. A team wins if they can goal in the ball into the opponent's goal post more than the opponent team does (Joseph A. Luxbacher, 2011: 2). As a popular sport, there are so many people want to excel in soccer. However, in achieving a good performance in soccer, a good training for the soccer players' physical fitness is very much needed.

Any kinds of sports always need a good physical support—whether it is low or high category of physical support—since the physical skill is a basic foundation for exercising. To achieve the best performance in soccer, the athletes need to have a good physical fitness. According to Charles B. Chorbin, et al (2008: 6), physical fitness in general is the body's ability to function efficiently and effectively. This state consists of at least five components of health-related physical fitness and six components of skills-related fitness, each of which contributes to the total quality of life. Physical fitness is closely related to someone's ability to work effectively, to enjoy the leisure time, to be healthy, to fight the disease or hyperkinetic condition, and to face the emergency situation. Although healthiness and fitness are different terms, they are still closely related. Unfortunately, without having regular physical activities, to reach a maximum physical fitness is deemed impossible There are many factors that lead into the decrease of someone's physical fitness quality, such as injury, nutrition intake, resting patterns, and less précised training designs. In addition, according to Fahey (2015: 8), physical fitness component is divided into two, namely health-related fitness and skills (neuromuscular)-related fitness. Health-related fitness consists of cardio respiratory endurance, strength, muscle endurance, flexibility, and body composition, while skill (neuromuscular)-related fitness consists of speed, explosive power, agility, balance, coordination, and reaction time. These biometry elements of physical fitness collaborate to create the perfect athletes' physical skills. To improve the soccer players' physical fitness, a good training is a must do.

Training is a systematic process that is carried out in the long term, repetitive, and progressive in order to improve the physical appearance. A good training is very much needed to improve the soccer players' skills and performance. The training process focuses on the development of specific attributes that correlate with the application of various tasks. These specific attributes are multilateral physical development, physical development for sports, technical skills, tactical abilities, psychological characteristics, health maintenance, injury resistance, and theoretical knowledge. The successful acquisition of these attributes is based on the individual's use of facilities and design methods that are suitable for their age, experience, and talent level of the athletes (Bompa, 2009: 4). In addition, Fox (1993: 693)

stated that training is a physical exercise program to develop the athlete's skills in facing the important matches. In order to achieve a good training, the applied training design shall be based on the training's principal and basic guidelines. Bompa (1994) added that there are five components of training; they are endurance, strength, speed, flexibility, and coordination. Training is eventually an interaction process between an individual with himself and with the environment, which is why the unmeasured training may give a negative impact on the athletes' physic and psychology. Thus, the athletes need to have a good method for training which is adjusted into the needs of their age characteristic. Since the researcher took the soccer school players of 10-12 years age group in Yogyakarta as the subjects of the study, thus it is quite important to discuss about the age matters.

The adults and children soccer players have different age characteristics. The training design given to them also varies. In childhood, children needs more time getting to know better about the social surroundings by doing some activities. Thus, it is better to introduce varieties of sports since they were child, for by having good physical activities may help them develop and growing up properly. The soccer school players of 10-12 years age group can be called prapubertal children. There are main factors that influence the development of prepubertal children; biological maturity, environmental factors and health, and the children's physical activity and inactivity (Jürimäe and Jürimäe, 2001: 1-12). Asides from these factors, prepubertal children are characterized from their motor skills. Motor skills are defined as the changes of motor skill behaviour over time and the processes underlying these changes. Jürimäe and Jürimäe (2001: 117-118) added that the product (any changes of motor behaviour) and the process (how and why these changes occur) are the prominent distinctions in studying motor skills during childhood. There are some factors influence motor skills development in a certain time period or age—including biological variables such as physical growth and maturity, and the environmental factors such as socioeconomic status and habitual physical activities. Pate (in Jürimäe and Jürimäe, 2001: 78) suggested the use of three different concepts of motor skills in children: motor performance, physical fitness, and health-related physical activities. In addition, the health-related fitness consists of cardio respiratory endurance, strength, muscle endurance, flexibility, and body composition.

A particular training design aims to reach the athlete's goal. A training design is not only closely related to the biometry needs, but also related to the athletes' age characteristics. One of the training designs for the prapubertal soccer players is play. Playing a game or two is one of training design. According to Freud and Erickson (in Santrock, 2006: 273), play is a very useful form of self-adjustment. Play helps children reduce their anxiety and control their inner conflicts since it helps them to release themselves from the pressure of the game, thus they can overcome their problems. Playing a game or two can help them releasing their excessive physical energy and express their hidden feelings. According to Hurlock (1995: 322-326), there are some play characteristics in childhood, they are tradition-affected play, play following the predictable patterns, varieties of plays decrease as they get older, play is only for social purposes as they grow up, play according to gender, non-formal play in childhood turns into the formal one, play is physically less active as they get older, play can be predicted from the children's adjustments, and there is a clear variation in children's play.

In order to improve the athletes' maximum performance, the researcher found that the play-based training design is needed. In general, the play-based training design gives the teachers the opportunity to mingle positively with their students and create the more enjoyable learning environment, both for the teachers and the coaches. The play-based training design also gives the opportunity for the youngsters to cooperate with each other, provides a clear analysis of skill performance of sports, and it also gives more insights about the athlete's skill and the advanced skills (Alan and Piltz, 2013: 9-12). The play-based physical training design is one of the trainings' varieties which makes the players feel challenged and more interested in doing something new. Play provides many benefits in the training; it gives the soccer players pleasures and satisfactions. The implementation of the play-based training design must be adjusted into the athlete's needs and the basic training principals, so that the goal of the training to achieve a good performance can efficiently and effectively be achieved.

In conclusion, to provide the need of a good training design which is suitable for the soccer school players of 10-12 years age group, the researcher apply the play-based training design which has been modified and adjusted into the characteristics of soccer player in the 10-12 years age group in Yogyakarta, in hope they can improve their physical fitness.

RESEARCH METHOD

1. Research Design

This research used developmental research design. The developmental research method is used to produce a specific product and to test the product's effectiveness. (Sugiyono, 2018: 297). This research was conducted in soccer schools in Yogyakarta, from December 2017 to August 2018.

2. Population and Sample

The population of the research is all of the soccer school players in Yogyakarta. The samples of the research are 60 soccer players which were divided into 30 people of experiment group and another 30 people of control group using a purposive sampling (Sugiyono, 2018: 85).

3. Research Procedures

The researcher used developmental research design proposed by Borg and Gall (1983: 775) and adjusted the procedures into three steps: first is needs analysis, second is product development by the experts' evaluations and field testing, and third is product's effectiveness testing by applying the two group pre test and post test design.

4. Research Instruments

The instruments of the research are first, a needs analysis by means of interview, second is the experts and field test using questionnaires, and third is product's effectiveness test using physical biometry battery test: (a) body composition: body mass index, (b) strength: leg dynamometer, (c) muscle endurance: push-up test, (d) cardiorespiracy endurance: multistage fitness test, and (5) flexibility: sit and reach.

5. Data Analysis

The data analysis techniques used in the research were qualitative and quantitative research design. The qualitative research came in as the results of the interview for the introduction. The quantitative data is in the form of preliminary test result and significance test. The preliminary test was divided into two; they are normality test and homogeneity test. The significance test used was the paired t-test.

FINDINGS AND DISCUSSIONS

Through some tests and evaluation, the researcher founds out that there are three main steps in obtaining the data and finally drawing the conclusion. The first step is a needs analysis. A needs analysis was obtained by interviewing the soccer coaches in Yogyakarta. The results are (1) the most frequently used physical training design is the conventional one, (2) the coaches were agreed to receive the developed play-based physical training design because the design is suitable with both of the athletes' characteristics and the using of the training principal, and (3) the coaches expected for the developed training design to be modified in the form of a guidebook.

There are two stages in the second step, they are developing the product and field testing. In developing the preliminary product, the design was reviewed and evaluated by the soccer expert, as well as the physical training methodology expert, and the soccer practitioner as an initial step to conduct the field test.

The final score from the soccer experts exceeded 92, 57%; it marks that the product is quite valid seen from some validity scoring criteria. The soccer experts in Yogyakarta also gave some suggestions related to the training design; (1) the instructions should be very clearly stated within the developed training design, (2) the games' principal should go along with the aims of the training, and (3) both of the field size and the duration of time of the games for the players' endurance should be clearly stated. After the soccer experts evaluated the training design, it can be concluded that the play-based physical training has more fun sides and more entertaining for the players, as well as it offers variety of games and is ready for field test.

The final score from the physical training methodology expert was 85, 14% by means that the product is quite valid seen from some validity scoring criteria. The physical training methodology expert gave some opinions toward the developed physical training design; (1) the structure of the written text in the guidebook needs to be fixed, (2) the given model of biometry physical training in each session needs to be adjusted so that it gives more time for the training adaptation process, and (3) the design should consider more about the games duration so that it would not cause the players extremely exhausted. In conclusion, the physical training methodology expert found out that the play-based physical training is well related to the training principals and the characteristics of children development and is ready for field test.

The final marks given by the soccer practitioner was 86, 85% by means that the training design's validity is very good, seen from the validity scoring criteria. According to the soccer

practitioner, the developed physical training design based in Yogyakarta should: (1) have clearer guidelines and instructions, it is better to add some images related to the instructions so that it can give more insights of the instructions, (2) have more equal division of numbers of the children so that the children will be more active in playing the games, and (3) fix the play duration in each session. In conclusion, the soccer practitioner stated that the training variations are quite interesting and are easy to apply and to be understood by the children, so that he agreed to field test the design.

The next step is the product field test by applying the play-based training design in both small and bigger group of soccer school players in the 10-12 years age group. The final score of small group test of 10 soccer players in Piyungan soccer school was 83, 28% which means it is quite valid. Thus, the play-based training design was ready to be tested in the bigger group. The final marks of big group test of 20 soccer players in Baturetno soccer school exceeded 87,52% by means that it is very well valid. Therefore, the play-based training design can be tested in the next step, which is effectiveness test.

The third step is the product's effectiveness test by testing the play-based physical training design to reveal the improvement of the physical fitness of soccer school players in the 10-12 years age group. The mean of the physical fitness pretest of soccer school players in the 10-12 years age group data is:

Table 1. The mean of physical fitness pre-test.

No	Biometry Components	Group	Marks
1.	Body Composition (BMI)	Experiment	18,07
		Control	18,28
2.	Strength (Leg dynamometer)	Experiment	38,33
		Control	39,73
3.	Muscle Endurance (Push-up)	Experiment	7,7
		Control	8,13
4.	Flexibility (Flexibility)	Experiment	25,1
		Control	24,76
5.	Cardio-respiracy Endurance (Multistage fitness test)	Experiment	31,23
		Control	32,89

After that, the group was given both of the play-based physical training design and the conventional training. It can be concluded that the players' physical fitness after given the training design is seen in the table below:

Table 2. The mean of physical fitness post-test

No	Biometry Components	Group	Marks
1.	Body Composition (BMI)	Experiment	18,3
		Control	18,46
2.	Strength (Leg dynamometer)	Experiment	42,68
		Control	42,9
3.	Muscle Endurance (Push-up)	Experiment	10,23
		Control	9,66
4.	Flexibility (Sit and reach)	Experiment	25,93
		Control	25,16
5.	Cardio-respiracy Endurance (Multistage fitness test)	Experiment	32,84
		Control	34,09

The quantitative was conducted through two steps: first is preliminary test by 1) normality test and 2) homogeneity test, and second is significance test.

Table 3. Normality Test Data

No	Group	N	$\bar{X}$	SD	L_{count}	L_{table} α 0.05	Category
1.	Experiment Group (BMI)	30	18,13	2,16	0,033	0,161	Normal
2.	Experiment Group (Strength)	30	38,3	7,26	0,141	0,161	Normal
3.	Experiment Group (Muscle Endurance)	30	7,70	1,57	0,025	0,161	Normal
4.	Experiment Group (Flexibility)	30	25,1	4,44	0,124	0,161	Normal
5.	Experiment Group (Vo2max)	30	31,23	4,59	0,079	0,161	Normal
6.	Control Group (BMI)	30	18,3	1,97	0,032	0,161	Normal
7.	Control Group (Strength)	30	39,73	8,18	0,147	0,161	Normal
8.	Control Group (Muscle Endurance)	30	8,13	2,28	0,058	0,161	Normal
9.	Control Group (Flexibility)	30	24,76	4,03	0,126	0,161	Normal
10.	Control Group (Vo2max)	30	32,89	4,92	0,104	0,161	Normal

Source: the processed primary data, 2018

In α = 0,05, the data above shows statistic value of $L_{count} < L_{table}$, it means that the data above is normally distributed.

The homogeneity test is for testing the similar variance in the population. This test was conducted by ANOVA. Below is the result of the population variance homogeneity test:

Table 4. Homogeneity test data

Group	Test	N	∑X and ∑Y	Mean	Ơ data	Fo	Ft	Category
Experiment	1	30	18,07	18,13	2,16	0,470	4,01	Homogen
Control		30	19,29	18,3	1,97			Homogen
Experiment	2	30	38,33	38,3	7,26	0.825	4,01	Homogen
Control		30	39,73	39,73	8,18			Homogen
Experiment	3	30	7,7	7,63	1,69	0,048	4,01	Homogen
Control		30	8,13	8,13	2,28			Homogen
Experiment	4	30	25,1	25,1	4,44	0,567	4,01	Homogen
Control		30	24,76	24,76	4,03			Homogen
Experiment	5	30	31,23	31,23	4,59	0,329	4,01	Homogen
Control		30	32,89	32,89	4,92			Homogen

Source: Primary data that is processed, 2018

Homogeneity test marked F_{table} = 4, 01. If the marks of $F_{count} < F_{table}$, then the experiment and controlled group resulted in homogenous data.

To find out the improvement of the treatment results, then significance test is needed by using paired t-test.

Table 5. Significance test data

Group	Test	N	∑pre-test	∑post-test	∑ significance	T_{count}	T_{table}	Category
Experiment	1	30	18,07	18,3	0,23	2,408	2,048	Significant
	2		38,33	42,68	4,35	3,870	2,048	Significant
	3		7,7	10,23	2,53	5,317	2,048	Significant
	4		25,1	25,93	0,83	5,000	2,048	Significant
	5		31,23	32,84	1,61	7,700	2,048	Significant
Control	1	30	18,28	18,46	0,17	2,262	2,048	Significant
	2		39,73	42,9	3,17	6,959	2,048	Significant
	3		8,13	9,66	1,53	3,802	2,048	Significant
	4		24,76	25,16	0,4	4,397	2,048	Significant
	5		32,89	34,09	1,2	7,242	2,048	Significant

Source : Primary data that is processed, 2018

The final product of the research is the play-based physical training design for soccer school player of 10-12 years age group in the form of a guidebook. The discussions of this study give insight about the further analysis results related to the relevant theories. The researcher found out that the research procedures produce three groups of discussion.

First is the introduction. This chapter is the initial identification of problems which are about to be revealed and discussed in the research. Borg dan Gall (1983) stated that “the need analysis is the collection of the preliminary information toward the condition differences that exist in the field and in the desired condition in order to solve the problems”. The subject of the research is soccer school players of 10-12 years age group in Yogyakarta who were given play-based physical training design which is relevant to learn the movement and relevant to the 10-12 years age group characteristics. The research took location in Yogyakarta since there has been good coaching development in Yogyakarta.

Second is the product’s development. The aim of this step is to obtain the physical training design that is suitable with the theoretical background. A) The theoretical review used is the theory of soccer, trainings, physical fitness, and the 10-12 years age group characteristics. B) Planning the developed training design. The developmental research produces theoretical-

conceptual framework, methodology-procedures, and an empirical practice. The play-based physical training design consists of (1) theoretical review as guidelines, (2) 19 forms of play-based physical trainings according to learning the movement stages and the characteristics of the 10-12 years age group soccer players, and (3) the play-based physical training.

Third is the testing. The results of the research consist of the experts' evaluation in the form of quantitative and qualitative research method, small and bigger groups testing, the final product testing, and the bigger group testing which was given training design which resulting in improving physical fitness of the soccer school players of the 10-12 years age group.

CONCLUSSION

Based on the data analysis and the research reviews, the research resulted in the play-based physical training design is proven to be able to significantly improve the physical fitness of the soccer school players in the 10-12 years age group in Yogyakarta. The result of the research is compatible with needs analysis of training design based on the athletes' age characteristics. Applying the training design is imminent factor in achieving the goal since the training design contains theoretical review and other factors contributed to strengthen the training design. The play-based training design was adjusted into the biometry needs of health-related physical fitness. By applying the play-based training design, the soccer players' functional skills—physical and psychological, are expected to develop well according to the steps/stages of training coaching.

REFERENCES

Bompa, Tudor O. (1994). *Theory and Methodology of Training, the Key of Athletic Performance. 3th Edition*. Kendal/Hunt: Publishing Company.

Bompa, Tudor O. and G. Gregory Haff. (2009). *Periodization*: *Theory and Methodology of Training*. *5th Edition*. Kendal/Hunt: Publishing Company.

Borg, W. & Gall, M. D. (1983). *Educational Research: An Introduction*. New York : Longman.

Charles B. Chorbin, et al. (2008). *Concepts of Physical Fitness*: *active lifestyles for wellness.* New York: McGraw-Hill Companies.

Fahey, Thomas D. (2015). *Fit & Well: core concepts and labs in physical fitness and wellness*. New York: McGraw-Hill Companies.

Fox E. L., Bowers R. W., Foss M. L. (1993). *The Physiological Basis for Exercise and Sport*. *5th Edition*. Boston-USA: WCB/McGraw-Hill.

Hurlock. E. B. (1995). *Personality Development*. New Delhi: Tata McGraw-Hill.

Jurimae Toivo and Jaak Jurimae. (2001). *Growth, Physical Activity, and Motor Development in Prepubertal Children*. Florida: CRC Press LLC.

Launder G Alan and Wendy Piltz. (2013). *Play Practice: Engaging and Development Skilled Players from Beginner to Elite*, Second Edition. United States: Human Kinetic.

Luxbacher. A. Joseph (2011). *Sepakbola: Langkah-langkah menuju sukses*. Jakarta : Rajawali Pers.

Santrock, J. W. (2006). *Life-Span Development*. New York: McGraw-Hill.

Sugiyono. (2018). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.