



Core Training Model Using Swiss Ball Based on Interactive Multimedia for Pencak Silat Athletes Aged 15-17 Years Students

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Abstract

Core muscles are very important for stabilization and building strength in all sports activities. This study aims to develop an interactive media design model as a source of exercise and to determine the effectiveness of the core exercise model based on interactive media using a Swiss ball on student athletes. Method: This study uses research and development, validity test of questionnaire conducted by experts in their field. Testing the ability of the product produced, using the design of experimental quesu done with the model Pretest-Posttest Control Group Design. The number of samples used as many as 60 athletes aged 15-17 years, divided into 30 experimental classes and 30 controls. Data analysis test the effectiveness of media training intractive developed using t test Increase the exercise results of athletes using Gain Score. Analysis: the average N-gain score for the experimental group obtained a value of 58 included in the category of quite effective, with a minimum N-gain score value of 19.53 with a maximum value of 200 while the N-gain score for the control class (conventional exercise model) is 25.4 included in the category of "less effective", with a minimum N-gain score value of 0.89 and a maximum N-gain value of 89.58. So it can be concluded that the core exercises using swiss ball are quite meaningful from the conventional exercise model. Conclusion: Based on the pretest and posttest evidence, core exercises using Swiss ball based on interactive media effectively increase core muscle strength. The effectiveness of core exercises based on Swiss ball must be accompanied by a training pattern that suits the muscle group and anatomical adaptation of the exercise according to the athlete's ability.

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INTRODUCTION

The development of coaching science is increasingly growing in its efforts to prepare the physical condition of athletes (Amrullah et al., 2022). According to (Harsono, 2017), most of this development is based on the better understanding of coaches and athletes about how the body adapts to various physical and psychological stresses, because there is a relation between body performance and various interventions from the training results. Therefore, training is very important to improve performance for an athlete (Patah et al., 2021), based on this, (Angga Septiadi, Widiastuti, 2019), it is important to determine the training program as a strategy for a coach to determine the peak achievement that will be improved.

The fundamental thing of training that must be known and understood by a coach and an athlete is the principles of training, because without the application of principles in training, it is impossible to improve performance. These principles apply in training physical, technical, tactical and mental aspects (Harsono, 2017) (T. O. Bompa & Buzzichelli, 2019). The principle of specificity applies in training muscle groups, because the principle of specificity emphasizes that even though the method and form of training are correct and appropriate to the movement, but according to Harsono in (Amrullah et al., 2022) the muscle group trained is not suitable for the movement pattern or skill of the sport, then the benefit is small for performance improvement. Therefore, training that focuses on specific training can be more beneficial (Oranchuk, 2021). In addition to the principle of specificity, the individual athlete is one of the main requirements of modern training. The individual needs of athletes require coaches to consider the skills, potential, learning styles, and sport requirements of athletes, regardless of their performance level. All athletes have physiological and psychological characteristics that need to be considered when developing a training plan (Harsono, 2017).

Some coaches often train with an unscientific approach by ignoring the training experience, ability, and physiological composition of athletes, worse still, some coaches get programs from top athletes and apply them to young athletes who do not have the physical strength, physiological basis, or psychological skills required for this type of program. As a result, young athletes cannot tolerate the advanced level athlete program physiologically or psychologically (Amrullah et al., 2022). Therefore, (Angga Septiadi, Widiastuti, 2019) training programs must be developed according to the established age standards, based on (T. o Bompa, 2000) there are 3 (three) rules that need to be considered in training adolescent athletes, 1). Develop flexibility, 2). Develop muscle tendon before muscle strength, 3). Develop core muscle strength before other strength. Based on that, the core training model is very much needed for adolescent athletes because the core or core muscles are the foundation of the human body, so it is suitable for the needs of adolescent athletes. Several studies have provided important information about core training from several tests of several populations to improve movement and reduce the risk of injury (Oliva-Lozano & Muyor, 2020) in line with (Marani et al., 2020) that core muscles are very important for stabilization and building strength in various fields of sports activities. Meanwhile, according to (McGill, 2010) (Shinkle et al., 2012), the core affects the stability of the movement system pathway of the upper and lower body extremities, so that it can support in protecting the spine and nerves during sports activities. Theoretically, according to Tse in (Amrullah et al., 2022), if the extremities are strong and the core is weak, then the decrease in muscle mass contraction through the core will result in reduced force and inefficient movement patterns. Based on several opinions, core strength is very important especially for adolescent athletes

The development of core training models has been increasing in recent years, one of them is training using a swiss ball, according to

(Marani et al., 2020) swiss ball is one of the training programs to train strength and stability of the core. In addition, training using a swiss ball according to (Amrullah et al., 2022) is safe to use if the training is adjusted to the training phases for adolescent athletes. Therefore, this kind of research needs to be done because it can provide information about the model and core training program that suits the characteristics of athletes both in terms of growth and development so that optimal results can be obtained.

Technology has penetrated human life and society and has become an important aspect in everyday life, including social life, education, work and religion (Xavier & Francis, 2017)(Sulaksono, 2021) Because to develop cognitive, metacognitive, emotional, psychological understanding and educators must use technology to design learning effectively (Crompton, et al, 2020). The development of multimedia technology at this time has developed very rapidly, with multimedia technology it is easier for society in everything from communicating to doing work and training (Mukhlis et al., 2022), according to (Wahyuni et al., 2021) Video-based learning media Tutorials are a series of live images displayed by instructors or professional players to help students understand learning material. Because according to (Semarayasa et al., 2023) tutorial videos are made to explain how to practice or how to explain certain tasks in detail. So that in student performance, tutorial videos are effective in improving sports learning (Cendra et al., 2019), (Heri et al., 2020)). Participants' interest in media is more active and highly motivated because it can display text, images, video, sound and animation (Koekoek, et al, 2019)

Based on this, interactive media has more value than usual training or learning. This supports the argument (Carmichael, et al, 2018) about the role of models in educational videos, where the voice, posture, facial expressions, and even movements displayed by the model can influence students' emotions. Because video media is one of the learning media that can stimulate students' thoughts and feelings so that

they can be involved and involved in the learning process (Pane, 2018), On this basis, interactive media has greater value than traditional training and learning. This supports the argument of (Carmichael, et al, 2018) investigating the role of models in educational videos and finding that the model's voice, posture, facial expressions, and even movements can influence students' emotions. Learning that suits learning styles provides a flexible and adaptable classroom so that it can increase motivation and achieve good performance (Billah & Yazid, 2020)(Jimola, F. E., Ofodu, 2021)

Many studies on cores, especially core stability, have been carried out. Several studies have been conducted in Indonesia, but most of the content analysis conducted in core stability focuses on the direct effect of Swiss ball-based core training. In line with this information, a study that examines core stability based on Swiss ball media by implementing an exercise that is divided into several stages of exercise to reduce the risk of injury, the training program is divided into stages of anatomical adaptation of the exercise under the principles of specific training needed in addition, application support regarding implementing an exercise program model for athletes can exercise independently, and that coaches and athletes will get information about the benefits of core stability training with Swiss ball media

So it is hoped that this will be a novelty in the core stability training program product using a Swiss ball based on interactive media for student athletes aged 15-17 years which was developed by researchers, which is expected to provide information for coaches to provide core training programs that suit the needs of adolescent athletes, especially those. Because the training program is structured based on the stages of the adaptation phase to the athlete's abilities so that the training program is safe, effective, useful and interesting so that athletes are motivated to train for core strength. Apart from that, training can be done anywhere independently by athletes and coaches because there is a core stability training program

application product using a Swiss Ball which can be downloaded or accessed easily on the web so that it can be used by anyone who needs a core training program using a Swiss ball for athletes aged 15 -17 years.

METHODS

This research and development (R&D) study used the Borg & Gall model with 10 steps (Artanayasa et al., 2023). The techniques used in collecting data for developing the core model using swiss ball based on interactive media were questionnaire, observation, test and documentation. To test the feasibility of the interactive media training model developed, a questionnaire from expert validation was used, involving 3 experts in their fields such as coaches, physiology, tests and measurements. Testing the capabilities of the product produced, using an experimental questionnaire design was carried out using the Pretest-Posttest Control Group Desing model (Prettest-Posttest control group design). The number of samples used was 60 athletes aged 15-17 years, divided into 30 experimental classes and 30 control classes. Analysis data for testing the effectiveness of the

training tool media that was developed using the t test. Increased training results from athletes according to Hake in (Damayanti & Yohandri, 2022) using the Gain Score.

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The research was conducted in June – August 2023 and located in Pontianak, Kalimantan Barat, Indonesia. It involved athletes/fighters of Pencak silat who were junior and senior high school students with the same ability level, aged 15-17 years, from four Pencak silat colleges. The four Pencak silat college include: Kijang Berantai College, Asad College, Wekasan College, Setia Hati College, and Tapak Suci College.

Table 1 Phases of Swiss Ball Exercise

Meeting	1	2	3	4
Phase 1 Adaptation	3 set,10 reps	3 set,10 reps	4 set,10 reps	5 set,10 reps
Phase 2 Development	3 set,10 reps	3 set,10 reps	4 set,10 reps	5 set,10 reps
Phase 3 combination	3 set,10 reps	4 set,10 reps	5 set,10 reps	3 set,10 reps

Table 1 explains that the experimental group received treatment, as many as 12 meetings for 4 weeks with a frequency of 3 times a week with swiss ball media exercises. The control sample group received conventional treatment according to the program given by the coach at their respective schools or clubs, namely normal core exercises. Although the two study groups received different treatments, the program material provided was the core training program.

The experimental group received a Swiss ball-based core training program divided into 3 phases. The first phase was the neural adaptation phase, including the neural

adaptation phase, the development phase, and the advanced combination phase; the neural adaptation phase involves basic stabilization to assist in developing motor control. The second phase was the developmental phase, which involved a variety of exercise movements that are more complex and more intense than the first phase in terms of difficulty of movement, with a description of the development of balance and strength in the core muscles. The third phase was advanced or combined with a focus on combined with other movements. Each program phase must be understood and implemented thoroughly before moving on to the subsequent phases. Those were conducted to provide enhancement loading so the endurance

and strength of the athlete improve as expected and can avoid the risk of injury.

Research data collection techniques were collected using a psychomotor test instrument which included a plank instrument and a modified bass test instrument of dynamic balance. Data were collected before (pretest) and after (posttest) treatment in the experimental and control groups. This data was analyzed to assess

the effectiveness of the core exercise model with Swiss ball media in the experimental group and compared with the control group.

The use of swiss ball training models for athletes directly to the application that can be downloaded directly directly via internet link and Explanation of the training model in the picture When clicked can be directly connected



Figure 1: Products In The Form Of Interactive Media

RESULTS AND DISCUSSION

The results of the research are products in the form of interactive media, Based on the assessment of the material experts on the scale of values, it can be seen that the total value of the initial draft of the core stability exercise model based on swiss ball for student martial arts athletes has met the feasibility requirements to be tested in the field. The material experts have also validated the initial draft of the core stability exercise model based on swiss ball for adolescent martial arts athletes to be tested in the field. The data obtained from the material experts are: (1) data on observation results with exercise media, (2) data on observation results of the effectiveness of the exercise media model, (3) data on exercise deficiencies, (4) data on input to the exercise model. Based on the expert test of 22 exercise models, 2 items were not feasible and 2 items were simplified in their implementation, so that from the revision and input of the experts, 19 exercise items were determined which were divided into training phases, so that 19 items were declared feasible to continue. The conclusions of the expert test conducted are summarized in the following table data:

Table 2 Data from observations of large group training with Swiss ball

No	Model	Expert Results			Criteria
		Model	Fisioterafis	Pelatih	
1	Adaptation Items 1-9	feasible	feasible	feasible	feasible
2	Advanced Items 10-17	feasible	feasible	feasible	feasible
3	Combination Item 18-19	feasible	feasible	feasible	feasible
Total		19 Training model that is declared feasible			

Apart from testing the training model, the researcher also gave questionnaires to the research subjects as the main actors in carrying

out activities in the field with the results summarized in table 3.

Table 3 Recapitulation of Data from Large Group Trial Results

No	Indicator	$\sum x$	$\sum xi$	%	Description
1	Convenience,	3468	4080	85	feasible
2	Attractiveness,	3478	4080	85.24	feasible
3	Asefulness,	3499	4080	85.75	feasible
4	Security	3448	4080	84.5	feasible
Total		13893	16320	85	feasible

Based on the revision from several experts in table 3, it can be seen that the average percentage of the results of the large group trial of 60 people was 85%, so that the overall product developed was in the feasible category and experienced a little revision based on field notes. This shows that the model developed during the show the principles of training and implementation of the model are met, then the application in the field does not experience significant obstacles.

After the revision of the expert test and the product trial that was declared feasible, the

next step was to test the effectiveness of the product developed on the use of the sample after being given treatment. Its effectiveness can be seen in the core training process using swiss ball based on interactive training media. The completeness and testing of N-Gain with results as in table 4. The result of the N-gain score test is how to calculate the difference between the posttest value of the control group and the posttest value of the experimental group, the ideal score description is the maximum value that can be obtained. The following are the results of the n-gain score values.

Tabel 4. N-Gain Score

Correspond	N-gain Score Test calculation results (%)		Description
	Control N-Gain Score	Experimental N-Gain Score	
Mean	25.4	58	quite effective
Minimal	0.89	19.53	
Maxsimal	89.58	200	

Based on the results of the N-gain score above, it shows that the average n-gain score value for the experimental group (core stability exercise model using swiss ball) obtained a value of 58 included in the fairly effective category, with a minimum n-gain score value of 19.53 with a maximum value of 200 while for the n-gain score for the control class (conventional exercise model) is 25.4 included in the “less effective” category, with a minimum n-gain score value of 0.89 and a maximum n-gain value of 89.58. So it can be concluded that the core stability exercise using swiss ball is quite meaningful from the conventional exercise model.

The results of the discussion after the core exercise treatment using a swiss ball based on interactive media showed that the addition of pressure on the synergistic muscles in stabilizing the trunk. Because core exercises using a swiss ball require balance, strength, and coordination that can be trained simultaneously as strength and stability (Amrullah et al., 2022). Based on these results, (Oliva-Lozano & Muyor, 2020), exercises using a swiss ball are one of the core exercises that can be recommended to develop lumbar multifidus (MUL) activation, because

these exercises have one of the highest % maximum voluntary contraction (MVIC) for this muscle. This exercise produces greater elecromyographic (EMG) activity than static front boards on the floor, which shows that adding a ball achieves the instability needed to increase EMG (James. yudas, Cendera C. Coleman, Erin E Holstad, Stephanie D. Long , 2018). The level of activation of this muscle is high (> 60% MVIC) during exercise, which is in line with the definition of previous researchers that MUL is a “local stabilizer” that provides stability to the pelvis when performing hip extension movements Jose (Oliva-Lozano & Muyor, 2020). Therefore, this exercise is highly recommended for the purpose of increasing muscle strength, considering the high level of activity observed not only in the core muscles, but also in the chest and lower extremities (James. yudas, Cendera C. Coleman, Erin E Holstad, Stephanie D. Long , 2018). In addition, the results of the study (Zarei & Norasteh, 2021) showed that the core stability exercise program improved the endurance of the core trunk muscles.

Based on some results from previous studies on the effectiveness of Swiss ball exercises, it is recommended for stability and

core strengthening exercises because Swiss ball exercises are safe for adolescents (Marani et al., 2020). In addition, this stability ball exercise is very simple, safe, and easy to use and can be used by all ages, both men and women, this exercise only takes up a little space and does not require a special room (Faries & Greenwood, 2007). However, core stability exercises based on Swiss balls must be accompanied by the application of the anatomical adaptation phase of athletes and the perfection of the exercise model movement to minimize injuries to athletes (Amrullah et al., 2022). In addition, the model form of the exercise is adjusted to the core muscle group that will be trained to get optimal results.

The interactive media-based training effectiveness mode also supports training effectiveness for athletes during training. By using multimedia, the media developed can involve the senses of sight and hearing, thereby increasing children's motivation and enabling athletes and students to be active in training (Carmichael, et al, 2018). In addition, research shows that students' attitudes and knowledge towards physical activity increase and internet-based interventions have a positive impact on students' knowledge and attitudes (Nazari, et al, 2020). The material absorption process can be carried out independently and anywhere (Vai et al., 2019).

CONCLUSION

For the effectiveness of developing core training media based on interactive media, good steps must be accompanied by knowledge and awareness of athletes in training, so that training

patterns and forms of training are improved according to muscle groups and adaptation of training anatomy according to the athlete's abilities. Therefore, knowledge of movement anatomy, physiology, and biomechanics is more competent to get better results. It's hoped that unborn can examine specific core muscle advancements and combine them with other media tools that can impact fashion in sports.

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