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DEVELOPMENT OF PLYOMETRIC EXERCISES IN LEARNING PHYSICAL EDUCATION

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Abstract

The problem's background in this study's the lack of variations in explosive power training used for leg muscles and the lack use of plyometrics in Physical Education courses. This resulted in the lower results of student's vertical jump jumps seen from the initial test of Physical, Health, and Recreation Education student's vertical jump. To overcome this, a plyometrics training model was developed to provide a Physical Education variety courses for the explosive power of student leg muscles. This research aims to develop a valid, practical, and effective plyometrics training model. This research type's research and development with a 4D model (Define, Design, Develop, Dessiminate). The subjects of the plyometrics exercise trial were 6 Health and Recreation Physical Education students in 2020. The data collection instruments used were validation sheets, practicality sheets, effectiveness sheets, and vertical jump tests for explosive power. Analysis results on the validity test obtained an average value of 92.5% with a very valid category. Practicality test obtained an average of 76.52% with the practical category. Then in the effectiveness test, the average vertical jump jump test was obtained with an average of 67% with the effective category. Thus, it can be concluded that the plyometrics training model for Physical, Health, and Recreation Education students can be applied to their lectures 'bout valid, practical and effective categories. Practicality test obtained an average of 76.52% with the practical category. Then in the effectiveness test, the average vertical jump jump test was obtained with an average of 67% with the effective category. Thus, it can be concluded that the plyometrics training model for *Penjaskesrek* students can be applied to Physical, Health, and Recreation Education's lectures in valid, practical and effective categories. Practicality test obtained an average of 76.52% with the practical category. Then in effectiveness test, the average vertical jump test was obtained with an average of 67% with the effective category. Thus, it can be concluded that the plyometrics training model for Physical, Health, and Recreation Education students can be applied to their lectures in the valid, practical and effective

categories.

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INTRODUCTION

Physical, Health, and Recreation Education (Penjasorkes) is an activity that is carried out using the physical body in order to gain strength in personal competence form, intellectual form, psychomotor and good character aspects. (Fischetti, Latino, Cataldi, & Greco, 2020). The aspects developed in physical education include cognitive, affective, and psychomotor aspects. Cognitive relates to one's knowledge, understanding, application, analysis, synthesis and evaluation, then affective relates to character or character and behavior such as feelings, interests, attitudes, emotions, 21st century projections according to (Baswedan, 2018) Moral character and performance character are the keys to one's success in education. whereas psychomotor is related to human motion which links nerves, for example walking, running, drawing, talking, putting things up and so on. (Syafi'i, Marfiyanto, & Rodiyah, 2018)

Psychomotor development can't be separated from habituation of a person from childhood to adulthood, because this aspect is obtained through a long process such as exercising and exercising regularly. (Wulf, Shea, & Lewthwaite, 2010). The development of science in the

world is very rapid in science, social, technology, health form and so on. Penjasorkes is a science that not only develops psychomotrics but also leads to freshness of a person. for example strength training, speed, endurance, agility, balance, and others (Anderson, Moggridge, Warren, & Shucksmith, 2015). Penjasorkes is beneficial not only for health but also for achieving an achievement. To get all this can't be separated from the hard work of the individual and the group. (Ricky, 2020).

The exercise form that we need to use to achieve achievement is to train physical fitness, parts of which are agility, strength, endurance of the lung and heart muscles, flexibility, and explosive power. (Syafuruddin, 2011). Explosive power is strength and speed result (Sole, 2018). If both people can lift a weight that weighs 60 kg, but one person can lift faster than the other, so that person has more explosive power than the slower person. The way to increase your explosive power is to use the Plyometrics training model.

Plyometrics is an exercise form often used by sportsmen because it quickly raises the jump significantly. According to Chu (in Nanda, 2018: 18),

said plyometrics is an exercise technique used to increase strength and explosive power. according to(Iqbal & Gushendra, 2016) Plyometrics exercise is an exercise that has a special characteristic, namely very strong muscle contractions which are a response to dynamic loading or rapid stretching of muscles involved.

For students, plyometrics practice really needs to be applied, especially in the *Penjaskesrek*. In addition to training their explosive power, the students have practical courses in field so it require that *Penjaskesrek* students have good physical fitness. Increasing the element of explosive power can be done by: 1) Increasing strength without neglecting speed or emphasizing strength. 2) Increase speed without neglecting strength or emphasizing speed. 3) Increase both strength and speed together(Donald A. Chu, 2013) .

Based on observations about Basic Badminton course, when warming up, students are slow to repulse at running starts, slow runs, and long finishes because of their weak explosive power. This is also reinforced by the interviews results with Badminton Basic activity coaches. According to it, that there is a lack of variation in training for explosive power, the lack of plyometrics training for *Penjaskesrek* lectures, and a lack of plyometrics training models to provide variations in *Penjaskesrek* lectures for student explosive power. Because of these problems, it is necessary to develop a Plyometrics training model for *Penjaskesrek* students that aim of

strengthening the leg muscles explosive power in students. Based on the description above, it is used as a research entitled "Development of Plyometrics exercises in Physical Education Learning". Based on the background of the problem, the problem in this study can be formulated as follows: "Is the Plyometrics training model developed for Physical Education students at Dharmas University Indonesia valid, practical and effective". The objectives achieved in this study are to develop a valid, practical, and effective plyometrics training model for Physical Education students at Dharmas University Indonesia. "Is the Plyometrics training model developed for Physical Education students at Dharmas Indonesia University valid, practical and effective". The objectives achieved in this study are to develop a valid, practical, and effective plyometrics training model for Physical Education students at Dharmas University Indonesia. "Is the Plyometrics training model developed for Physical Education students at Dharmas Indonesia University valid, practical and effective". The objectives achieved in this study are to develop a valid, practical, and effective plyometrics training model for Physical Education students at Dharmas University Indonesia.

METHODS

According to (Atiq, Tangkudung, & Mulyana, 2017), development research is a research that is carried out in order to obtain new results or outputs, or to elaborate on outcomes that have been previously made, with analysis in the

field (observations, interviews, initial needs questionnaires). According to(Sugiyono, 2016), research development used to produce certain products, and assesses the products effectiveness. According to(Ricky & Triana, 2019) stating that Development Research is a research that is based on the manufacture of an effective product, starting with a needs analysis, product development, and product testing.

The method used is Research & Development. The R & D method consists of various models. One of the R&D models used is the 4-D model. The 4-D model is a learning device development model. The 4D development model consists of 4 main stages, are: Define, Design, Develop and Disseminate.(Sulistiyani & Retnawati, 2015). Methods and models are used to produce outputs which will be in the various exercises form. The output made after that is tested for its feasibility with validity and testing the output so that we know better the usefulness of leg muscle explosive power training in students after using the exercise model.(Kurniawan & Hayudi, 2018).

Sampling Procedures

This research and development subject includes two subjects. The first subject is the validator, which consists of four expert lecturers on two subjects, one language, and one construct. The second subject is practitioners, namely lecturers, teachers and students consisting of six people with the subject of Physical Education students at Dharmas Indonesia

University. Technique used is purposive sampling based on certain considerations(Yusuf, 2005). Sampling was only carried out with a small group that took high, medium and low scores, amounting to six people. The research object's the quality of the plyometrics exercise model book for physical education

Data Analysis Design

Research design uses four stages, namely definition, design, development, dissemination or what is called the 4-D development model (Sugiyono, 2012), of these four procedures researchers will develop training models. plyometrics with validity, practicality and effectiveness tests, after all these tests the researcher will make an output in plyometrics training model book form which contains ways to do these exercises so that they are easily understood by readers and users, which can be explained in the following figure:

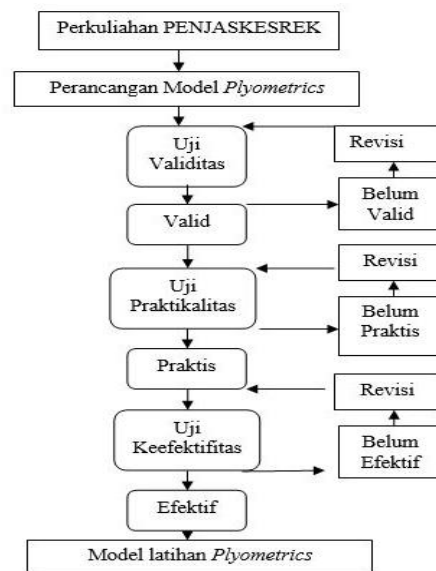


Figure 1. Development Procedure

This research was carried out at Dharmas Indonesia University, Dharmasraya Regency, West Sumatra with the subject of Physical, Health and Recreation Education's students. Instrument in this study, namely equipment in the form of facilities, infrastructure, tests, which will be used by researchers in retrieving data in the field effectively and efficiently in order to make it easier for researchers to carry out work so that it is achieved properly. (JUNAEDI, 2016), for explosive power instruments using the vertical jump test. Can be seen in the image below:

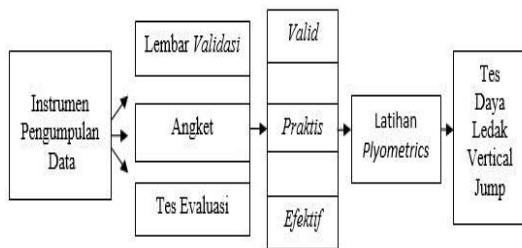


Figure 2. Flow of Plyometrics exercise eligibility assessment

Researchers used analysis of validity, practicality, and effectiveness. Data analysis techniques, are processing something material that is easy to understand and can be applied, good information in problems form, the potentials that are developed in later research will become information that is easy to understand.

RESULT

Validity test to show the measuring instruments extent used in what's being measured (Yusup, 2018), The validity results were obtained from the

observation sheet filled in by 4 validators. This validator is divided into content validators, language validators and construct validators. The validator sheet consists of 11 statements. Presentation of validity data in the plyometrics training model trial for Undhari Physical Education students is useful for determining the appropriateness or accuracy of the plyometrics training model that has been made by the researcher.

Data analysis

In this development research, to produce a plyometrics training model that is valid, practical, and effective, four stages are carried out in accordance with the development procedure used. The following is a description of the four stages of developing the plyometrics training model.

1. Define Stage

The defining stage aims to define the steps, create a plyometric training model, then see what is needed in the lecture process based on the objectives and course material.

2. Design Stage

The preparation results of assessment instrument:

a. Validation sheet

The validation sheet contains instructions for filling in and two aspects that are assessed, namely the relationship with the presentation of the content, and the constructs and scores that will be filled in by the validator. The results of

the validation by the content validator Andiyanto, M.Pd with a result of 87.5% were categorized as very valid, the second content validator, namely Maldin Ahmad Burhan, M.Pd with 80% results was categorized as valid, the validator for Rusyda Ulva, MA with 75 results. % is valid category, while construction validator Efri Yandani, M.Kom, with 80% result is categorized as valid.

b. Practicality sheet

Next stage, the practicality of plyometrics training model's to find out whether the plyometrics training model developed is practically used in the lecture process. Practicality aspects which include practicality questionnaire sheets on the responses of lecturers and students to the training model used. Practicality by practitioner M. Sukron, M.Pd with 83.3% results is categorized as very practical, second practitioner Feri Ferianto, S.Pd with 80% results is categorized as very practical

c. Effectiveness sheet

At this stage, an evaluation is carried out to determine whether the training model is effective to achieve effective goals. The effectiveness sheet validation design (vertical jump test) result with a result of 67% is categorized as effective, and all participants experienced an increase from the initial test and the final test.

Product Revisions

The products that have been tested then revised according to input and suggestions from the validator before

testing the exercise model and after using plyometrics training model which will be tested on Undhari Physical Education Students. The first validator Andiyanto, M.Pd, namely the UNDHARI *Penjaskesrek* lecturer and also the UNDHARI soccer coach gave advice on the training program, training materials that must be adjusted to the objectives of learning for students. The second validator, Maldin Ahmad Burhan, M.Pd, provided input on improving the drawing of the training model so that it was easy to understand, the third validator was Rusda Ulva, MA, the language was clarified, abbreviated, made steps so that the exercise was easy to understand, the fourth validator was Efri Yandani, M. Com, cover the model book according to the theme, the exercise image is enlarged again.

Table 1. Data Validity of Plyometrics Exercise Model

Validator	%	Category
Andiyanto, M.Pd	87.5%	Very Valid
Maldin Ahmad, M.Pd	80%	Valid
Rusyda Ulva, MA	75%	Valid
Efri Yandani, M.Kom	80%	Valid
total	80.6%	Valid

Presentation of practical data. The plyometrics exercise model is useful for knowing the practicality of model created, that the plyometrics exercise (Nurliauwaty, Mujasam, Yusuf, & Widyaningsih, 2017), for practicing researchers, two lecturers and a PJOK teacher as users of this plyometrics training model can be seen in table 2:

Table 2 Practical Data of Plyometrics Exercise Model

No	Practitioner	Result	Category
1	M. M.Pd	Sukron, 83.3	Very Practical
2	Feri S.Pd	Firianto, 77.7	Practical
3	total	80.5	Practical

Effectiveness data presentation in plyometrics exercise model trial is useful for knowing the effectiveness of plyometrics training model developed by researchers, it can be seen from the student training results in table 3:

Table 3 Data on effectiveness of the plyometrics training model from the vertical jump results

No.	Score	Criteria
1	53	Well
2	46	Enough
3	62	Very well
4	46	Enough
5	53	Well
6	55	Well

The plyometrics training model development's to be effective if the final vertical jump test results are 53-61 cm in Good category. Based on the initial test and the final test on the vertical jump jump, it was found that students who got very good category results were 1 student, good category 3 students, and enough category 2 students, with a percentage of 67% said to be effective and 33% ineffective.

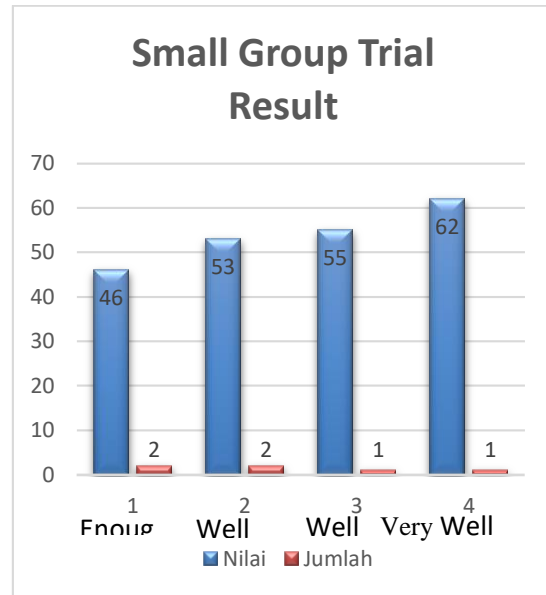


Figure 3. Bar diagram of vertical jump test values

DISCUSSION

Based on the plyometrics exercise model development in physical education classes to facilitate lecturers and teachers corner in providing understanding to students, because lectures are conducted by directly involving students. physical education lectures using the plyometrics exercise model are able to provide variations in field lectures so as not to be boring for students and can attract student attention when the lecture process takes place(Herring, 2006).

1. Plyometrics Exercise Model Validation

Plyometrics training models development to support the lecture process. Plyometrics training model must be in valid category, so it is appropriate or appropriate to be used in lecture process. In this study, validation carried out included aspects of validation assessment, discussion and construction validation.

Plyometrics exercise model developed has reached very valid categories. Average validation of plyometrics exercise model by three validators is 80.6% with a valid category. exercise models that have been assessed by validators with valid categories, then the exercise models can be tested in physical education classes.

2. Practical Plyometrics Exercise Model

The plyometrics exercise model practicality is determined by the practitioner who claims that plyometrics exercise model developed is applicable. The plyometrics exercise model that is developed is said to be practical if the practitioner's assessment results using the practicality sheet of plyometrics exercise model in value range with the paractic category.

The assessment results of plyometric exercise model with a value of 76.52% are categorized as practical.

3. The effectiveness of the plyometrics exercise model

Plyometrics training model development is said to be effective if the final vertical jump test result is 53-61 cm with a good category. Based on the preliminary and final tests on vertical jump jumps, it is found that students who get very good category results are 1 student, good category 3 students, and moderate category 2 students, with a percentage of 67% said to be effective and 33% ineffective.

Discussion should relate the results to current understanding of the scientific problems being investigated in the field.

The discussion section provides an opportunity to critically assess the findings of other studies.

CONCLUSION

Based on the development and results of the validity, practicality, and effectiveness that have been carried out on the plyometrics training model in lectures *Penjaskesrek* to Undhari *Penjaskesrek* students, the conclusions are as follows:

1. Validity results of plyometrics training model in Physical Health and Recreation Education students assessed by the three validators (expert team) with an average of 80.6% were categorized as very valid.
2. Practicality results of plyometrics exercise model in Physical Health and Recreation Education students assessed by one practitioner with 80.5% are categorized as practical.
3. Effectiveness results of plyometrics exercise model for Physical Health and Recreation Education students seen from the vertical jump test on students, a percentage of 67% are categorized as effective, with the criteria Very Good 1 student then Good criteria 3 students while 2 students with Sufficient criteria.

Suggestion

Based on the development that has been carried out, the authors suggest the following:

1. For researchers, hopefully this plyometrics training model can add new experiences and insights to researchers.

2. For lecturers, hopefully this plyometrics training model can be used in the field by lecturers to deliver material to students.
3. For the campus, that is, hopefully the plyometrics training model can be used as a facility on campus.

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