



DEVELOPMENT MULTIFUNCTION BALL FOR SPORT AND PHYSICAL EDUCATION HEALTH EDUCATION

Mugiyo Hartono ✉

Educational Management of Postgraduate Program of Semarang State University

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Abstract

The aims to this research is to desain the multifungtion the ball that can fulfill the needs of basketball, volleyball and football games, The methodes are; 1) neds analysis, 2) Designing the initial product, 3) initial product; 4) Validation of expert by using experts; 5) Revision of the first products is done for the improvement of expert evaluation results; 6) Small scale test trials; 7) Revision of the second product; 8) large-scale trials; 9) Revision of the final product; 10) Deployment and implementation of results. Samples of small-scale trials use 36 elementary and junior high students, and for large-scale trials use 72 students of Elementary and Junior High Schools in Semarang City. The results of the final product are a multifunctional ball for basketball, volleyball and football with a size of 66 cm, made from sponge material PU (Poly Urhetane), a smooth non-slippery, weight of 270 grams, 0.250-0.3 bar of air pressure and has reflections of 105-115. Ball design describes characteristic of three ball, there are basketball, volleyball and football with bright and interesting colors. Conclusions in this study are a multifunctional ball with the correct specification as in the research results above, has a multifunction for basketball, volleyball and football for Elementary and Junior High School students, does not cause pain because they are light and proper size for Elementary and Secondary School students.

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✉ Alamat korespondensi:
Kampus Unnes Bendan Ngisor, Semarang, 50233
E-mail: pps@unnes.ac.id

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INTRODUCTION

As we know that there are at least three sports games are commonly used as a medium of learning movement in schools particularly great ball game sports, namely basketball, volleyball, and football. Due to the unavailability of a suitable ball media with the ability of the students, both the shape and size, it is generally what happens is the teacher of Physical Education, Sport and Health uses standard size balls in playing the sport as a medium of motion in learning at school. This condition causes a lot of students, especially those who are still in elementary school and junior high school, to be afraid to try to play the ball because the first experience of contact with the standard ball causing pain in the arms, legs, head and other body parts. Such a situation is certainly very beneficial in motivating students to freely conduct the game of basketball, volleyball and soccer, so unwittingly also less favorable conditions for the development of national sports extensively, especially in finding potential talent on the level of learners from a young age.

The idea to design and develop a suitable ball multifunctional, comfortable and does not cause pain that can be used by learners, as well as the type of ball can be used to play the game of basketball, volleyball and soccer in the teaching of Physical Education, Sport and Health, especially in elementary and junior high schools, based on several reasons, among others:

- 1) Focus on the development of teaching Physical Education, Sport and Health at the elementary and junior high school, as the emphasis of the development of the students at that age are in motion functions for elementary school, and the motion for junior high school. Besides her children in early elementary school age through junior high school have sports that are multilateral or studying movement as a whole. So at that time required the flexibility and experience as much motion.
- 2) With a convenient and multifunctional ball painless to play the game of basketball,

volleyball and soccer, expected learning Physical Education, Sport and Health at the elementary and junior high school more enjoyable for students in general.

- 3) Through the learning of Physical Education, Sport and Health pleasant, it is expected that more students are motivated to do the motion and was able to explore movement skills, which in turn will provide great opportunities and facilitate the emergence of potential sporting talent in the golden age.
- 4) During this time, shortage of funds is the reason for the lack of classic media / tools to learn, in this case is the ball. In addition, the already limited funds should be spent on at least 3 different types of balls to play a variety of games namely three basketball, volleyball and football. Consequently, it is not uncommon in any occasion played one game, available only 1 or 2 balls for 30 to 40 learners. This condition would be very unfortunate for the students to explore their movement abilities, for their chance to play and touch the ball during the learning takes place becomes very limited. Multifunction ball is expected to be a solution for this condition, because the ball can be used to play the third game.
- 5) Ball multifunction has the opportunity to be developed and produced in large quantities, given the potential market is huge. (Data from 2010 in Indonesia the number of elementary schools 174.922, and junior high schools 47.182)

Taking into account the description of the background and the reasons above, the researchers felt it important to create a design that can double ball for the game of basketball, volleyball and soccer balls or called Versatility, especially for students in the learning of Physical Education, Sport and Health in Schools elementary and junior high school.

Based on the background and the identification of problems that have been outlined, the research problem can be formulated as follows:

- 1) How Multifunctional ball design that can double for the needs of the game of basketball, volleyball and soccer and can be utilized for the benefit of learners in the learning of Physical Education, Sport and Health in Primary and Secondary School?
 - 2) How far multifunction ball for the game of basketball, volleyball, and football may increase the motivation of learners on the move and more fun in the process Learning Physical Education, Sport and Health in Primary and Secondary School?
- the child's condition, the material the ball too hard, etc..
- 2) Lack of infrastructure and facilities owned by the school, so the ratio of the number of students with equipment owned less balanced.

In modifying the game by Ateng (1992) can be done by (1) reducing the number of players in a team, (2) reduce the size of the field or narrowed, (3) reducing game time, (4) shorten the net, basketball hoop or widen the net: (5) ease in scoring by widening the net, with no goalkeeper or by other means, (6) use a lighter ball, beach volley ball or a ball for junior volleyball to football and basketball, (7) change the rules to make the game can run.

More similar by Asep Suharta (2007:47-48) that in order to modify the game in physical education and sport has the following characteristics: (1) according to the ability of the child (age, physical fitness, health status, skill levels, and previous experience), (2) safe play, (3) has several alternative aspects such as size, weight and shape of equipment, field games, play time, rules, number of players, rotation or position players, 4) to develop players and sports skills relevant to used as the basis of further development.

From the above it can be concluded that the opinion of the efforts for learning motion can be carried out effectively and efficiently, it is necessary game equipment modification, which essentially make it easier and fun kids to move, so as to motivate the child to move on and provide experience motion as possible. Thus, the idea to develop a more convenient multifunctional ball of balls there before for a game of basketball, volleyball and football is fundamental, given earlier theories of discourse and the underlying importance of providing for modification of equipment to meet learning needs in the context of the motion of Physical Education, Sports and Health in school.

2.2. Infrastructure Physical Education, Sport and Health

In general, infrastructure means everything is supporting the implementation of a

LITERATURE REVIEW

2.1. Physical Education, Sport and Health

Physical Education, Sport and health is one of the subjects carried out on primary education, secondary and even higher education. In the document National Education Standards Agency (BSNP) (2006: 702) noted that Physical Education, Sport and Health is an integral part of education as a whole, which aims to develop aspects of physical fitness, motor skills, critical thinking skills, social skills, reasoning, emotional stability, moral conduct, aspects of a healthy lifestyle and clean environment through the introduction of physical activity, sport and health are planned systematically selected in order to achieve national education goals. Efforts to improve the quality of learning can be done by modifying the game, infrastructure and Physical Education, Sport and Health. Modifications carried out by teachers for a variety of considerations, including the lack of effectiveness of the learning process due to:

- 1) infrastructure and facilities used in the study were not appropriate to the child's level of ability and development, as well as the use of standard ball imposed for elementary school children and junior high schools, so that children have difficulty in moving, for example, caused by a ball that is too heavy , the size of the ball is not in accordance with

process (for business development). In a sport known as the infrastructure is something that facilitate or accelerate the task and have a relatively permanent nature. Working paper good sports must meet standard sizes such as, among others: the sports field, building / hall, stadium (Supartono, 2000:5). Sports facilities is something that can be used and utilized in the implementation of sports activities, which consist of equipment (apparatus), and equipment (device). Equipment is something that is used, for example crate jump, single beam, parallel bars, rings, horses. As with the equipment that is something that complements the infrastructure, for example: net, flags to mark, boundary lines, as well as something that can be played or manipulated by the hands and feet, for example: ball, racket, bat (Supartono, 2000:6).

2.3. Playing Basketball, Volleyball and Football

The basic assumption of the concept of education through movement (pedagogistic) is that the motion is the best medium for exploration, communication and personal development in general the orientation on the function of the exploration and communication of motion. Function refers kekenyataan exploration that children in particular contact with his world and explore and expand their world through Garak and moves himself and manipulating the environment. Communication function refers to the fact that humans can communicate and learn social roles through movement and play. (Depdiknas, 2003: 105-106).

Sports game of basketball, volleyball and soccer is a sport that has the characteristics and advantages of complex motion is open. The complexity of the game of basketball, volleyball and soccer can be seen from a wide variety of techniques such as kicking motion, namely, lead, control, robbing, passing, heading, smash. Furthermore, when viewed from the gestures needed to perform the movement techniques, the required movement running, throwing, catching, hitting, pushing, swinging, jumping, hold. Besides, it is also to ensure that these

movements can be done well, it is necessary to support adequate physical ability such as the components of speed, endurance, strength, explosive power, flexibility, reaction, balance, accuracy, agility.

Playing basketball, volleyball, and football is a matter that is taught to students in elementary and middle school, the third game is a game that has the form of characteristics different from the other games that are taught in school. Games that use a large sphere has a complexity of basic movement techniques each have a fairly high level of difficulty and need the support of good physical abilities. Besides of each game is specifically required for the ball with different specifications for the needs of motion techniques, such as related to the size of the ball, heavy ball, wind pressure, materials, resilience / rebound, elasticity ball.

Some basic techniques in each game going on related directly or direct contact with the ball is as follows: for the game of basketball as the basic herding techniques, pass, catch, and shoot the ball into the hoop. Basketball dribbling with the ball bouncing a given pressure and thrust the ball down, pass and shoot the ball by providing forward thrust ball, catch the ball by holding the ball due to the pressure that exists, all movements will occur direct hand contact on the ball result of a given power, resulting in a difference in weight, light, pain, or other flavors for every child who does.

Similarly to the volleyball game that is the movement pasing technique down, pasing up, service, smash each movement techniques require direct touch between the hands to the ball and even harder than the game of impact has basketball.

For the game of football has a difference with his game above the limb touches the ball with his hands not only alone, but almost all parts of the body can be in direct contact with the ball. For example, kicking, driving control with some parts of the body (eg head, chest, abdomen, thighs, and legs), headed by the head, catching the ball for the keeper, throw the ball into, etc., So as to touch the football game

against the body ball more complex than the game of basketball and volleyball.

METHOD

Model Development

According to Borg and Gall Meredith Damin (1983:775-776), that research and development is a process that is widely used in education and learning, which is basically research and development procedure consists of two main objectives, namely: (1) developing new products and , (2) test the effectiveness of the product to achieve the goal. The first goal is called as a function of development, while the second objective function is called validation.

Accordingly, the development is the systematic use of scientific knowledge focused on the production of materials, devices, systems, methods, models, including the process of designing the prototype / design.

The research process research taken ten steps, namely (1) research and information collecting, research and information gathering, (2) planing, planning, (3) develop a preliminary form of the product, the development pattern of introduction of the product, (4) preliminary field testing, preliminary trial, (5) playing product revision, revision of major products, (6) playing field testing, field trials main (small scale), (7) operational revition product, product revision operations after getting input from small-scale trials, (8) field operational testing, implementation of major trials (large scale), (9) the final product revision, the revision of the final product, (10) Domination and implementation, deployment and implementation.

3.2. procedure Development

3.2.1. Needs Analysis

1) Analysis of the specifications and characteristics of the three kinds of balls, namely basketball, volleyball, football that has been widely used from several types and brands of balls. The steps are as follows:

- (1) Analyze materials, structures, and frame the ball

- (2) Measure the pressure, waist circumference, weight balls of various sizes ball that has been there and is widely used in schools

- (3) Analyze the reflection / lentingan balls of various floor conditions, different types of materials, different ball sizes.

2) Analysis of strengths and weaknesses ball design according to the characteristics of the technical side of the game is the third movement of the basketball, volleyball and football. The steps are as follows:

- (1) Analyze the movement of the ball from a variety of forces thrust given on the ball
- (2) analyze the degree of pain or discomfort caused by friction or impact has ball on the members of the body (legs, arms, head and other body parts)
- (3) to analyze the level of difficulty (weight, size, material) using a ball

3.2.2. Initial Product Design and Manufacture

1. Design and construct multifunctional ball specifications
2. Design and specify a range of multifunctional spherical aberration
3. Designing and determine the classification results multifunctional ball design
4. Determining an appropriate reflection of the ball high to the characteristics of elementary school children and junior high sekollah. In this case, anthropometric measurements (knee high, waist high, shoulder high) elementary and secondary school children, to get the average ideal
5. Designing the shape / pattern and color multifunction ball by expert design art
6. Consult the results of the three steps above the bulb specification technology consultant, a sports game, a physical education, sport and health
7. Consult all relevant parties ball manufacturer technical and ball-making mechanism.

3.2.3. Early Ball Multifunction Products

From the results of the design of multifunctional ball further consulted with the manufacturer for further investigation, as far as specs are designed multifunctional ball allows for diproduk. Taking into account the technical aspects of the various manufacturers, the technical side of the mechanism of manufacture, availability of materials, complexity of design, production time, and other steps to be followed appropriate procedural rules of the company.

3.2.4. Validation Expert

The initial design multifunctional ball before tested in small-scale tests, the first test-specific and skaligus validated by experts in accordance with the field of study. To validate the products to be produced, the researchers will involve experts, among other things: 1) Experts ball specifications, 2) Expert sports games (basketball, volleyball, soccer), 3) Expert Physical Education, Sport and Health, 4) Expert engineering to measure the strength of the material sphere.

3.2.5. Revised First Product

The results of trials conducted exclusively by sports experts and technical experts play ball with the results of the input made product improvement suggestions to get the ball multifunctional as expected.

3.2.6. Small Scale Test

Small-scale trials carried out to determine the extent of the initial product feasibility are made, using descriptive analytical approach, which is done through a test ball through movement techniques according to the characteristics of the game of basketball, volleyball and soccer. In testing the characteristics of the three movement techniques appropriate games (basketball, volleyball and soccer) plan involving 36 children try (18 children son / daughter from elementary school Ngijo 01 Gunungpati Semarang and 18 children son / daughter of the junior high school 34 Semarang). For the purpose of analysis involving experts of physical education, sport and health, engineers, specifications specialists ball, and the laboratory.

The results of the expert evaluation and testing of small-scale input and suggestions for improvements are to be reviewed in order to further refinement of the product.

3.2.7. Product Revised Second

After going through a small-scale trials, and with input from experts on the basis of the study, analysis and observations in the field, then the product with improvements which, of course, the consultation of technical experts from the ball mill which produces multifunctional ball. Of the improvements expected will get the ball closer to the product specification multifunction ball suitable for elementary school children and junior high school in a game of basketball, volleyball and football.

3.2.8. Large Scale Testing

After the revision of the product will resume large-scale trials in the field using test subjects the student sons and daughters class IV, V SD Ngijo 01 and 02 Gunungpati Semarang some 36 children, as well as students of class VII and VIII SMP Negeri 34 Semarang number of 36 children.

Large-scale trials have two main objectives, namely 1) to obtain input from the technical evaluation results in the use of appropriate characteristics of the ball game, and 2) selecting the most appropriate ball and appropriate for children in the third game of basketball, volleyball and football.

3.2.9. Revised Final Product and End Product Multifunction Ball

After revision of the product and through the production process again from the manufacturer then the last stage is the final product to be a multifunctional ball game basketball, volleyball and football for elementary school children and junior high school to use the learning of Physical Education and Sport in school.

3.2.10. Deployment and Implementation Results

To account for the results of scientific research embodied in a text document in the form of research reports, to be published and implemented to the public.

3.3. Design And Testing Samples

The design of this trial conducted in two phases, namely small-scale trials and large-scale trials. Large-scale trials conducted field tests using descriptive analysis involves three factors, namely the size of the ball 64, 66, and 68 cm with 2 different materials, namely the materials PU (Poly Urhetane) and PVC (Polyvinel Chloride). So that there are 6 different ball

variables tested in the range of movement in the game of basketball, volleyball and football. Besides, due to get nominated multifunctional ball design is best suited for older elementary and junior high school, the kids try to do all the same treatment in each cell. The design pattern is a design using Repeated Measurements (Repeated Measured) to a variety of treatments and the number of samples in each cell.

3.3.1. Sample Trial Design Small Scale

Table 2. Sample Trial Design Small Scale Ball Multifunction

	Motion Basket (throwing, catching, dribel, shooting)			Motion Volley (passing, Service, Smash)			Motion Football (kicking, control, dribble, heading)		
Circle Materials	64 Cm	66 Cm	68 Cm	64 Cm	66 Cm	68 Cm	64 Cm	66 Cm	68 Cm
Spon PU	36	36	36	36	36	36	36	36	36
Spon PVC	36	36	36	36	36	36	36	36	36
	36			36			36		

Description:

Each block movement of the game using the same 36 samples, consisting of: 18 elementary students son/daughter (class V) and 18 junior high school students son/daughter (class VII)

3.3.2. Sample Trial Design large Scale

Table 3. Sample Trial Design Large Scale Ball Multifunction

	Motion Basket (throwing, catching, dribel, shooting)			Motion Volley (passing, Service, Smash)			Motion Football (kicking, control, dribble, heading)		
Circle	64 Cm	66 Cm	68 Cm	64 Cm	66 Cm	68 Cm	64 Cm	66 Cm	68 Cm
Materials									
Spon PU	72	72	72	72	72	72	72	72	72
Spon PVC	72	72	72	72	72	72	72	72	72
	72			72			72		

Description:

Each block movement of the game using the same 72 samples, consisting of: 36 elementary students son/daughter (class IV-V) and 36 junior high school students son/daughter (class VII-VIII)

3.4. Subject trial

Test subjects in this study were student sons and daughters grade IV-V Elementary School, and the son of the daughter of the students of class VII-VIII SMP. As a test object will perform a wide range of motion exercise game of basketball, volleyball and soccer ball using multiple samples of multifunctional products with different sizes and materials.

3.5. Test Strength of Materials Ball

Two different materials are used to make the ball multifunctional, ie material PU (Poly Urhetane) and PVC (Polyvinel Chloride), note power with a laboratory Department of Mechanical Engineering Faculty of Engineering, State University of Semarang.

The method used in testing the strength of this material is an experimental method with faux leather material testing using tensile testing machine Gotech U60. Explicitly, this faux leather material testing aims to determine the tensile strength comparison of two faux leather material being tested, will therefore be known advantages and disadvantages of each of the imitation leather.

3.6. Types and Sources of Data

Sources of data in this study are the primary source of data obtained through laboratory testing, and secondary data sources through field trial results with searches in elementary school and junior high school.

The data generated in the process of testing these products in the form of qualitative and quantitative data. The qualitative data obtained from the observation and observation of the balls used in the game of basketball, volleyball and soccer, conducted by practitioners of physical education and sport, and expert sports games. While quantitative data to be obtained through an assessment by the users are students and scholars and teachers of Physical Education and Sports of the products tested.

3.7. Data collection instruments

Data collection instruments in a trial of this product uses observation, questionnaires and assessments.

3.8. Data Analysis Techniques

Data were analyzed with simple statistics (average, percentage) accompanied by descriptive narratives, ie data observations in the form of qualitative data, by conducting in-depth scrutiny and examination of the information and

or feedback can be captured analyzed using qualitative analysis techniques.

Examples of quantitative data analysis (percentage):

$$P = \left[\frac{s}{n} \right] \times 100$$

Description:

p = values obtained

s = score obtained by the students

n = maximum score

4. Result

Through step-by-step development method that starts from the needs analysis as a reference in designing products to produce the

ball early, further validation of experts to look at the feasibility of the initial product ball. The results of validation experts to revise the product prior to the small-scale trials performed by 36 children SD Kalisegoro Gunungpati and SMP Negeri 34 Semarang Semarang. From the test results on a small scale there is a second revision of the product, further large-scale trials involving 72 elementary and junior high school children of the same, but with different samples.

From a series of step-by-step model of development being done on the validation process and material tensile test conducted by experts, the end product multifunctional ball suitable for primary and secondary school children in the game of basketball, volleyball and soccer are as follows:

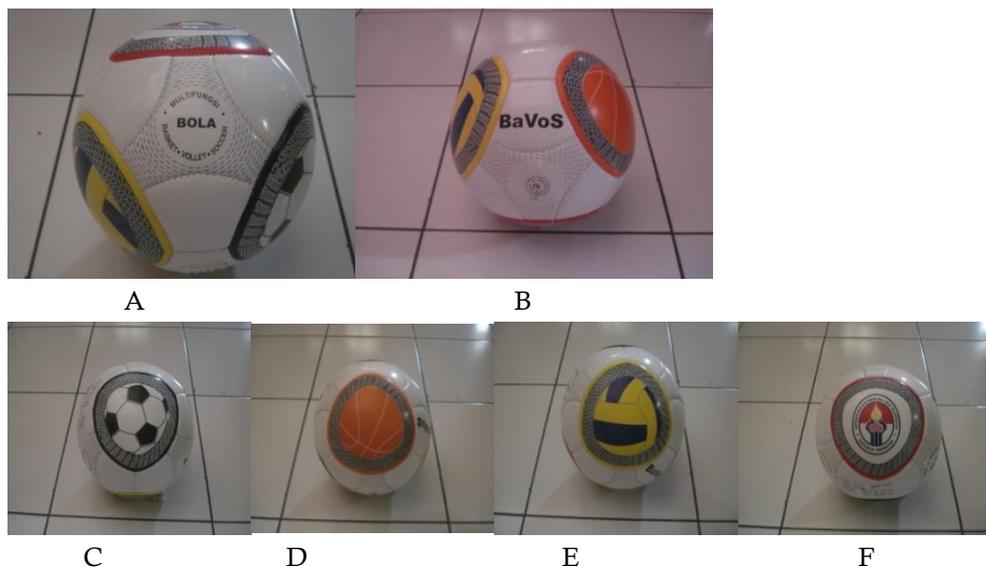


Figure 1. Multifunction Ball End Products Seen From Different Sides

Multifunction ball into the end product, as seen above, namely:

- 1) Figure 1A: multifunctional ball on the panel obtuse triangle with curved lines that read "BULB" middle surrounded writing upper ball bearing Versatility and under Basketball, Volleyball, Soccer.
- 2) Figure 1B: As in Figure A, but on the other hand, there is a vent on the obtuse triangle with curved lines and the panel above it reads BAVOS (stands for Basketball, Volleyball, Soccer).

- 3) Figure 1C: characterized by a focus on the panel with a picture of a soccer ball in terms of five black and white.
- 4) Figure 1D: on the side panel of basketball characterized by curved lines and a patterned beige.
- 5) Figure 1E: depicts the ball is characterized by volleyball picture rectangular panel interlocking yellow and blue.
- 6) Figure 1F the panel provided for the placement of the picture symbol / logo needed.

Table 4. Multifunction Ball End Product Specifications

The Size of the ball	Materials	Desain/Collor	Pressure	Weight	rebound	Structure
66 cm	Smooth and slippery material made of sponge PU (Poly urhetane)	Divided into 4 panels obtuse triangle each picture and color characterized basketball, volleyball, soccer, and logo. Another panel pieces are triangular and rectangular interlocking.	between 0,250 – 0,3 bar-kg/cm ²	270 gram	105 – 115 cm (from a height 200 cm)	The exterior form of soft panels machine stitched. The inside of the ball are made of thin rubber that is protected by a fine thread wrapped around the rubber surface. Equipped vent.

DISCUSSION

From the results mentioned above to get the ball multifunction options suitable for use in three games (basketball, volleyball and soccer), which is a ball measuring 66 cm with a sponge material PU (Poly Urhetane). Multifunction ball 66 cm size 1 cm bigger than volleyball or soccer ball standards for children's sizes (size 63-65 cm), but still smaller than a soccer ball 3 cm standard adult size (size 69 cm).

From the results of the study experts Physical Education and Sports games, for the consideration of the needs of motion in basket ball that require greater support than volleyball and football, then at least the size of the circle multifunctional ball would be more appropriate if it can accommodate the characteristics of basketball despite the fact the selection of participants students and experts are still far below the normal size basketball.

Multifunction ball made of sponge PU (Poly Urhetane) which has the characteristics of lightweight, supple, smooth and slippery, the material has a thickness of 2 cm in the form of soft sponge so as to provide comfort in a wide range of motion for the game of basketball,

volleyball and football. With the convenience of the ball kids will not have problems in performing activities of motion, so the reason for the child because of the characteristics of motion constraints balls used for this are not in accordance with the child's ability, has been answered by the alternate solution multifunction ball. Thus multifunctional ball is lighter and comfortable than the balls that have been there, will provide an alternative option that can be used in the game of basketball, volleyball and soccer and is suitable for the learning process of Physical Education and Sport in school. It is proven that children do not feel fear and doubt, even had the nerve to play the ball and touch, besides that it also children showed enthusiasm and excitement in using multifunctional ball, so it will provide its own motivation if multifunctional ball used in teaching Physical Education and Sport in school.

Multifunction ball size 66 cm with a weight of 270 grams, although already in the initial specification of the range of prototype multifunctional ball, one that requires weighing between 248-270 grams, but it still is at its highest rate in the range of the maximum ball weight tolerance. From the results of

consultation with the technical experts in the sphere of production PESPEX Ball Company, said that to be much more flexible at least not in the numbers in the middle of the tolerance range ranged between 255-260 grams, the required rubber ball inside to be getting thinner, and layers also should be such a thin thread anyway. If the specification criteria were enforced, it will decrease the power level of the ball because the material gets thinner (vulnerable when it gets pressure from 0.250 to 0.3 bar), in addition to the use of activities, basketball, volleyball and soccer are demanding range of motion with enough hard knocks . To that end specification multifunction ball there, already at the limit of minimum standards was based on considerations of power and convenience of the ball. But still provided an alternative to the other that the weight is expected to be realized, if using better quality material of PU and the material is certainly hard to find in the country.

Framework and structure which consists of spherical outer layer of the ball and the inside of the ball a given layer of nylon, is the minimum standard ball that has decent power and characteristics. Moreover, multifunctional ball made for the benefit of elementary and junior high school children who have a certain skill level. In theory, in the manufacture of the ball there are two ways, namely by way of sewing and laminating. Sewing system can be done by hand or hand sewing, and sewing with a machine. For laminate system is by way of attachment of the panel-panels using glue and pressed firmly with a special tool. Laminate system also required a tool that pattern must be specially prepared in the size of the ball that will diproduk. From a technical expert information sphere, said that to make a ball with laminate system, go through the initial process of sewing a ball system first, because to get the precision measure, cut panels and other characteristics have to go through a process of testing the viability through trial and error , so that the system can be done if the system laminates sewing is really no problem technically. The main drawback with the system of the ball is stitched on the seams still have holes that

allowed water to enter seep into the ball, so the ball will gain weight.

In a small-scale trial investigators had tried to use the ball field when wet, it is evident after heavy balls used are rising an average of up to 18 grams, or about 6-7%. Weight of that is felt to the size of the children when it comes to conflict with the ball. Unlike the balls are made with a laminate system no holes in the panels of the ball. According to information from the production, lamination ball into the water absorbing balls opportunity only 1-2%, so very much when compared with the ball made by sewing.

CONCLUSIONS

Conclusions

1. Multifunction ball that can be used to play basketball, volleyball and soccer for children of elementary and junior high school are the most feasible, balls the size of 66 cm with a sponge material PU (Poly Urhetane), soft and squishy, having 270 grams weight specifications, reflection 105-115 (dropped from altitude 200 cm) with a pressure between 0.250 to 0.3 bar. Specifications else is having the panels include a circle divided into 4 panels obtuse triangle, each picture and color characterized basketball, volleyball, soccer, and logos, Another panel pieces are triangular and rectangular interlocking. Variations panel with bright color and image design gives third Typically the basket ball with the color brown, blue yellow volleyball and football black and white.
2. Multifunction ball if it is used for the game of basketball, volleyball and football for elementary and junior high school children is painless because it is lightweight, so it does not cause doubts for children to touch and play the kids have a sense of excitement and passion when using multifunctional ball well in a variety of movement the movement of basketball, volleyball and football. Multifunction ball

gives its own motivation for the child, so it will have a positive impact on the learning process of Physical Education and Sport in school.

Suggestions and Recommendations

1. Weight 270 grams multifunction ball even have entered the required weight tolerance range, but the figure is still within the maximum limit. Hope more Berata least reach between 255-265 grams.
2. Ball with sewing system provides many opportunities high water absorption, so if used in wet field conditions, heavy balls will increase. For that further development can be done with laminate system (paste), although the direction of lamination systems takes time and cost in higher production.
3. Even if the ball is still necessary multifunction further developments, but for the use of children in elementary and junior high basketball games, volleyball and soccer are the industry standards.
4. For teachers of Physical Education and Sport can utilize multifunction ball as an alternative to the game of basketball, volleyball, football can motivate children in the learning process of Physical Education and Sport.

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