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Development of A Smash Drill Training Model To Improve Smash Accuracy In Extracurricular Volleyball Students In High School/Vocational School

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ABSTRACT

This study aims to develop a straight and cross smash drill training model using root obstacles to improve smash accuracy in extracurricular volleyball students. This study uses the Research and Development (R&D) method with a development model referring to the Borg & Gall 7-step model, namely: (1) Preliminary study, (2) Planning, (3) Initial draft design, (4) Initial draft validation and revision, (5) Product trial (small-scale trial/revision, large-scale trial/revision), (6) Final product, (7) Effectiveness test. The research subjects were ten volleyball extracurricular students at SMA Negeri 10 Purworejo Regency and ten students of SMK Vip Ma'arif Nu 1 Kemiri. The validation results showed that the developed training model was declared "valid" with a score of 0.825 from the material expert and 0.75 from the media expert's score. Then the results of expert validation in small-scale trials got a score of 0.818 with the criteria of "valid", then for the results of expert validation in large-scale trials got a score of 0.85 with the criteria of "very high and valid". The effectiveness test got a p-value smaller than 0.05, namely 0.00 <0.05. These results indicate that the development of a drill smash training model using root obstacle media is effectively applied in extracurricular activities to improve smash accuracy in volleyball extracurricular students. These results indicate that there is an influence on the development of a straight and cross-direction drill smash training model using root obstacle media to improve smash accuracy in extracurricular volleyball students.

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A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
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INTRODUCTION

Volleyball is a sport played by two teams of six players each. The goal is to get the ball over the net into the opponent's court and land it in a specific manner to win (Janah et al., 2021). In volleyball, the smash is one of the most vital and effective attacking techniques for scoring points and demonstrating team dominance on the court. However, in practice, many students participating in extracurricular activities experience difficulty directing smashes precisely to the target area. Initial observations

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at SMA Negeri 10 Purworejo and SMK Ma'arif Nu Kemiri showed that students participating in extracurricular activities experienced difficulties directing smashes precisely to the target area.

This problem indicates a weakness in the current training approach, which is often conducted conventionally and does not fully support the development of specific skills such as determining attack angles and reading the opponent's space. Smash training still uses traditional methods that are monotonous and lack innovation. Coaches tend to maintain old training patterns without updating, simply providing smash drills in directions determined by the students.

Training focuses more on successfully getting the ball over the net and into the opponent's court, without considering variations in ball placement. As a result, students become accustomed to smashing haphazardly, aiming only for areas they already know, thus underdeveloping their skills in directing the ball to various corners of the court. Lack of variation in training also contributes to suboptimal smash technique learning. Therefore, innovation is needed in systematically designed training models to improve smash accuracy in a repetitive and structured manner.

One innovative approach to improving the effectiveness of smash training is the smash drill model using obstacles. (Suhairi & Arifin, 2022) Smash drills aim to develop players' attacking skills by emphasizing precise hitting technique and timing. This training not only improves hitting power but also fosters accuracy when executing smashes in real-world conditions. Based on this opinion, it can be concluded that the drill method is a form of training performed repeatedly with the aim of gradually and consistently improving students' skills. (Rukmini et al., 2023) The drill method is characterized by a high frequency of repetitions; consistent repetition can help students strengthen muscle memory and hone their skills. According to Zauharudin et al. (2023), modifying the training environment, such as using obstacles, can improve technical skills in various sports activities. In this context, the use of root obstacles is an alternative that can positively contribute to improving the accuracy of students' smashes, while also adding variety to training and motivating students.

Various previous studies have shown that drill-based smash training can have a significant impact on improving basic technical skills in volleyball, especially in the smash aspect. Research by (Puput Widodo, 2022) Based on the results of the study, it is known that: (1) Front smash drill training has a significant effect on increasing smash accuracy in volleyball games in students who take part in volleyball extracurricular activities at MTs Sultan Agung Kalipoh, with an increase percentage reaching 96.79%. Research by (Kajian & Ilmu, 2023). The results of this study indicate that the "Development of a Drill-Based Volleyball Game Smash Training Model for Beginner Athletes" is feasible to implement. The feasibility of this training model is proven through a series of assessments carried out by experts, namely coaching experts, volleyball experts, and motor movement analysis experts. The final assessment results from the coaching experts show that this drill-based smash training model is considered 'feasible to implement' with a feasibility level of 95%.

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Based on the results of the study above, it can be identified that there is a gap in the research in the form of the lack of development of a smash technique training model that specifically combines straight and cross smash directions with the help of physical obstacles such as roots. This study aims to "Develop a straight and cross smash drill training model using root obstacles to improve smash accuracy in volleyball extracurricular students at the high school level". As an alternative method of smash technique training that is more structured, interesting, and effective in improving smash accuracy in volleyball extracurricular students at the high school level. In addition, this model is expected to be a practical reference for extracurricular coaches and PJOK teachers in designing more innovative and applicable training.

METHODS

This study uses the research and development method (R&D) concerning the Borg & Gall model. According to Borg and Gall (1983), in Rajeski (2023), research and development (R&D) is a process used to develop and validate products used in the field of education and learning. However, in its implementation, the Borg & Gall development model, which originally consisted of ten steps, was simplified into seven main steps by adjusting to the needs and context of this study. This simplification was carried out for time efficiency and effectiveness of implementation in the field, without reducing the essence and quality of the R&D process. The seven main steps used in this study are: (1) Preliminary study, (2) Planning, (3) Initial draft design, (4) Validation of the initial draft and revision, (5) Product trials (small-scale trials/revisions, large-scale trials/revisions), (6) Final product, (7) Effectiveness test.

Preliminary Study

The research and information gathering stage is the initial step aimed at identifying and obtaining the necessary data for the product planning and development process. The information for this study was obtained through direct observations by the researcher of extracurricular volleyball training participants at SMA Negeri 10 Purworejo and SMK Vip Ma'arif Nu 1 Kemiri. Based on these observations, it was discovered that the smash training methods employed by the coaches were still monotonous. Most coaches still employed conventional smash drills, which involved randomly smashing in various directions without specific direction from the coach. As a result, students were accustomed to hitting smashes that relied solely on sharp, dipping power, without considering the direction of the ball's fall or strategies for avoiding opponent blocks. However, in a match, to effectively score points, players must be able to direct the ball into empty areas on the opponent's court while avoiding blocks from defenders.

Planning

Planning was carried out by designing a product in the form of a teaching module book containing a smash drill training model to improve smash accuracy in volleyball extracurricular students, especially at SMA Negeri 10 Purworejo and SMK VIP MA'ARIF NU 1 Kemiri. At this stage, the developer took the following steps: (1) Determining the

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teaching materials used to create the product, and (2) Determining the volleyball smash drill training model.

Initial Product Development

The product developed in this research is a teaching module book containing a drill smash training model to improve smash accuracy among volleyball extracurricular students at SMA Negeri 10 Purworejo and SMK VIP MA'ARIF NU 1 KEMIRI. At this stage, the researcher carried out several steps, including: creating a development flow, gathering supporting materials, creating a design, creating instruments, and initial production.

Expert Validation and Revision

Validation is the stage of assessing the feasibility of the product, a teaching module book containing a drill smash training model to improve smash accuracy among volleyball extracurricular students. This assessment is conducted to ensure that the developed product meets the required standards. Responses and input from the experts are analyzed to determine any revisions needed by the developer. Product revisions are then implemented based on the suggestions provided by two material experts and one media expert.

Product Trial

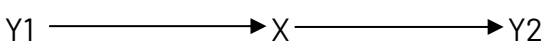
After the product has been validated by the experts, the next stage is a small-scale trial. The purpose of this trial is to evaluate the feasibility of the product, a drill smash training model developed to improve smash accuracy in volleyball. A small-scale trial was conducted in the volleyball extracurricular activity at SMK VIP Ma'arif NU 1 Kemiri, involving a limited number of 10 students. The developed training model was assessed by the coaches and students. The evaluation results were then analyzed and used as a basis for improvements or revisions to the product before moving on to the next trial phase: the Large-Scale Trial.

After revisions based on the results of the small-scale trial, the next stage was a large-scale trial. This trial aimed to assess the feasibility of the product, a drill smash training model designed to improve volleyball smash accuracy. The trial involved 20 volleyball extracurricular students at SMA Negeri 10 Purworejo, consisting of tenth and eleventh graders. The product was assessed by the coaches and students involved in the activity. The assessment results were then analyzed and used as a basis for more comprehensive product improvements or revisions.

Effectiveness Test

An effectiveness test was conducted to determine the extent to which the developed smash drill training model was able to improve smash accuracy in volleyball. The effectiveness test was conducted at two different schools: SMA Negeri 10 Purworejo and SMK VIP Ma'arif NU 1 Kemiri, involving 10 students at each school, for a total of 20 students and 14 regular training sessions. The effectiveness test in this study used a quasi-experimental approach. The research design used was the "One Group Pre-test Post-test Design," an experimental design that does not involve a control group for comparison. Sukardi, 2015, in (Rajeski, 2023).

The intended experimental design is as follows:



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The data analysis technique used by this researcher involved three types of analysis, namely: validation test and effectiveness test. The validation test was conducted using the Aiken V formula with the help of Microsoft Excel. For the effectiveness test, the researcher applied three stages of prerequisite tests, namely: normality test, homogeneity test, and hypothesis test. The normality test aims to determine whether the sample comes from a normally distributed population. The homogeneity test is used to test whether all samples have similarities or not (uniform). After the data is declared normal and homogeneous, hypothesis testing is carried out using the t-test. All prerequisite test calculations and hypothesis testing are carried out using the IBM SPSS (Statistical Package for the Social Sciences) application.

RESULTS AND DISCUSSION

Result

The development results, namely the expert validation process and the effectiveness test results, are presented in the form of an overview of the data displayed in a summary table. The findings are further explained and followed by a discussion as follows.

Table 1.
Results of the Aiken Index Analysis of Media Experts

No. Question	Analisis Indeks Aiken's V					
	Media Expert Total Score	s	∑s	n(c-1)	V	Provision
1-10	40	30	30	40	0,75	Valid

Based on the table above, Aiken's V value obtained from the media expert validation results is 0.75. Following Aiken's V interpretation criteria developed by Azwar (2012), an Aiken's V value ≥ 0.60 is categorized as "Valid", while a value ≥ 0.80 is categorized as "Very Valid". Thus, a value of 0.75 can be categorized as valid and indicates that the media aspects in the developed training model have met the eligibility criteria for further testing.

Table 2.
Results of the Aiken Index Analysis of Subject Matter Experts

No. Question	Validator	s	∑s	n(c-1)	V	Provision
	Subject Matter Expert					
1-10	43	33	33	40	0,825	Valid

Then, for the results of the validity test of the material expert data analysis in Table 2 above, using the Aiken V validity test, it got a value of 0.825. The results of the material expert validity test value got a value of "very high". It can be concluded that the Material Expert test of the product development of the drill smash training method to improve smash accuracy in volleyball extracurricular students can be used and is said to be "very valid".

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Table 3.
Results of Aiken's V Index Analysis of Small-Scale Trials

No. Question	Validator		s1	s2	∑s	n(c-1)	V	Provision
	Coach	Subject Matter Expert						
1-10	47	47	36	36	72	88	0,818182	Valid

The results of the small-scale trial in Table 3 above show that the validity of the material assessed by two coaches through Aiken's V Test obtained a score of 0.818182. Based on this figure, it can be concluded that the level of validity according to the material experts in the small-scale trial is classified as "very high". Thus, the product of the development of the drill smash training method to improve smash accuracy in extracurricular volleyball students is declared "very valid" and worthy of being continued to the large-scale trial stage.

Table 4.
Results of Aiken's V Index Analysis of Large-Scale Trials

No. Question	Validator		s1	s2	∑s	n(c-1)	V	Provision
	Coach	Subject Matter Expert						
1-10	48	49	37	38	75	88	0,852273	Valid

The results of the large-scale trial in Table 4 above show that the validity of the material assessed by two coaches through Aiken's V Test obtained a score of 0.852273. Based on this figure, it can be concluded that the level of validity according to the material experts in the large-scale trial is classified as "very high". Thus, the product of the development of the drill smash training method to improve smash accuracy in extracurricular volleyball students is declared "very valid" and worthy of being continued to the effectiveness test stage.

Table 5.
Normality Test Results

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PreTest	,144	20	,200*	,958	20	,501
PostTest	,206	20	,026	,932	20	,167

The normality test can be said to be normal if the p-value is greater than 0.05; then the data is considered normal. Conversely, if the p-value is less than 0.05, then the data is declared abnormal. Based on the table above, the results of the Shapiro-Wilk Normality test from the Pre-test show a probability value (sig.) of 0.501. Because the p-value > 0.05, it can be concluded that the data has a normal distribution. Meanwhile, the results of the Post-test show a probability value (sig.) of 0.167. With p > 0.05, this value indicates that the data is normally distributed. Both datasets have a normal distribution, or the population from which the sample was taken is normally distributed.

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Table 6.
Homogeneity Test Results

	Levene Statistic	df1	df2	Sig.
Based on the Mean	1,588	1	38	,215
Based on the Median	1,587	1	38	,215
Based on Median and with adjusted df	1,587	1	29,875	,217
Based on the trimmed mean	1,584	1	38	,216

Homogeneity testing can be said to be homogeneous if the p-value is greater than 0.05; then the data is considered homogeneous. Conversely, if the p-value is less than 0.05, then the data is declared inhomogeneous. Based on the results of the data analysis above, the p-value obtained is 0.216 greater than 0.05. Therefore, it is concluded that the data is homogeneous.

Table 7.
T-Test Results

	Paired Differences				
Statistic	**Mean**	**Std. Deviation**	**t**	**df**	**Sig. (2-tailed)**
Pretest - Posttest	3,050	2,305	5,918	19	,000

Based on the results of the data analysis above, it can be concluded that there is a significant difference, because the p-value is less than 0.05, namely 0.00 < 0.05. Thus, it can be stated that there is an influence (effectiveness) of smash drill training on increasing smash accuracy in volleyball athletes.

Discussion

The purpose of this research is to develop a training method in the form of a volleyball smash drill training module to improve smash accuracy among extracurricular volleyball students, while also assessing the feasibility and effectiveness of the product. Furthermore, this research aims to evaluate the responses and input from experts, including media experts and content experts, regarding the developed product. This research aims to provide solutions to the problems outlined in the background section, namely the limited resources for volleyball training, particularly in the form of smash drill training books.

Volleyball is a sport played by two teams of six players. The goal is to get the ball over the net into the opponent's court and land it in a specific manner to win (Janah et al., 2021). Volleyball involves several basic techniques, including serving, underpassing, overpassing, and smashing. A smash in volleyball is a powerful shot directed into the opponent's court to score a point. To execute an effective smash, good coordination between strength, jumping technique, speed, and accuracy of the shot's direction is required.

The smash is a crucial basic technique in volleyball and is considered the most effective method for scoring points. This technique is executed through a powerful, targeted shot that passes over the net and enters the opponent's defence, to place the ball in an area difficult for the opposing player to reach. According to Wunu et al. (2024), a good smash requires a combination of power, speed, and precise technique. This makes

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mastering the smash technique key to increasing a volleyball player's effectiveness. Key factors for a successful smash are the strength of the arm, abdominal, and leg muscles, which support the ability to smash effectively (Agasta et al., 2023).

The media expert validation result was 0.75. According to the Aiken V interpretation criteria developed by Azwar (2012), an Aiken's V value ≥ 0.60 is categorized as "Valid," while a value ≥ 0.80 is categorized as "Very Valid." Thus, the value of 0.75 can be categorized as valid and indicates that the media aspect in the developed training model has met the eligibility criteria for further trial stages. Then, for the results of the validity test of the material expert data analysis using the Aiken V validity test obtained a value of 0.825 was obtained. The results of the material expert validity test obtained a value of "very high" It can be concluded that the material expert test of the product development of the drill smash training method to improve smash accuracy in extracurricular volleyball students can be used and is said to be "very valid".

The results of the small-scale trial in Table 3 above show that the validity of the material, as assessed by two coaches using Aiken's V-Test, achieved a score of 0.818182. Based on this figure, it can be concluded that the level of validity according to the material experts in the small-scale trial is categorized as "very high." Therefore, the product developed for the drill smash training method to improve smash accuracy in extracurricular volleyball students is deemed "very valid" and worthy of proceeding to the large-scale trial stage. The results of the large-scale trial in Table 4 above show that the validity of the material, as assessed by two coaches using Aiken's V-Test, achieved a score of 0.852273.

Based on this figure, it can be concluded that the level of validity according to the material experts in the large-scale trial is categorized as "very high." Therefore, the product developed for the drill smash training method to improve smash accuracy in extracurricular volleyball students is deemed "very valid" and worthy of proceeding to the effectiveness test stage. The normality test can be considered normal if the p-value is greater than 0.05, indicating that the data is considered normal. Conversely, if the p-value is less than 0.05, the data is considered abnormal. Based on the table above, the results of the Shapiro-Wilk Normality test from the pre-test show a probability value (sig.) of 0.501. Since the p-value is > 0.05, it can be concluded that the data has a normal distribution.

Meanwhile, the results of the Post-test showed a probability value (sig.) of 0.167. With p> 0.05, this value indicates that the data is normally distributed. Both data have a normal distribution, or the population of the sample used is normally distributed. Homogeneity testing can be said to be homogeneous if the p-value is greater than 0.05; then the data is considered homogeneous. Conversely, if the p-value is less than 0.05, then the data is declared inhomogeneous. Based on the results of the data analysis above, the p-value obtained is 0.216 greater than 0.05. So it is concluded that the data is homogeneous. Based on the results of the data analysis above, it can be concluded that there is a significant difference, because the p-value is smaller than 0.05, namely 0.00 <0.05, and it is stated that there is an influence (effectiveness) of smash drill training on increasing smash accuracy in volleyball athletes.

CONCLUSION

Based on the findings of the research and development process that has been carried out, it can be concluded that the smash drill training model with straight and cross directions using Root obstacles shows significant effectiveness in improving smash accuracy in volleyball extracurricular participants at SMA Negeri 10 Purworejo. This designed training model not only provides a variety of approaches in training methods, but also contributes to increasing technical understanding, enthusiasm for training, and motivation of students in participating in extracurricular activities. Therefore, this model is worthy of being used as an innovative alternative in volleyball smash technique training programs, both in the formal education realm and in sports club environments.

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