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# Innovative volleyball training tool: AcuSpike drill with Android sound reactions

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## ABSTRACT

**Background Problems:** The development of technology and sports science plays a crucial role in the world of sports. **Research Objectives:** The objective of this research is to create a volleyball smash drill training tool based on voice reaction in the form of an Android application as an innovation and to determine the level of impact produced by the tool. This volleyball smash training tool is equipped with a voice-reacting Android component that can be adjusted according to the user's needs. **Methods:** The research employs both qualitative and quantitative research methods using the Research and Development (R&D) approach, encompassing stages such as needs analysis, development planning, expert validation, small-group testing, large-group testing, revisions, and final product development. To assess the effectiveness of the tool, experiments are conducted using the tool during training sessions. Data collection is carried out through observations, interviews, and questionnaires. Both quantitative and qualitative analyses are utilised for data analysis. **Findings and Results:** The research findings indicate that the Android-based voice command-reactive Acuspikes volleyball product is deemed appropriate and can significantly contribute to athlete development, improving game quality, and overall volleyball sports development. However, the limitation of the research lies in the subject being studied at one location. Therefore, further research is recommended for broader generalisation over the long term. **Conclusion:** In conclusion, volleyball smash skills can be enhanced using the Acuspikes volleyball smash tool, emphasising the importance of considering the use of Acuspikes tools in both practicing and learning volleyball smash techniques.

**Keywords:** Acuspikes; volleyball; smash skill



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## INTRODUCTION

Volleyball is a sport that has flourished in various countries, including Indonesia, with its popularity continuing to grow worldwide. Essentially, the fundamental principle of playing volleyball is to prevent the ball from touching the ground; the ball is played within one's own court with a maximum of three touches and is aimed to be sent over the net to the opponent's court through a challenging spike or smash technique (Silva et al., 2019). A team collaborates to devise attacking and defensive strategies in volleyball matches in

order to secure victory (Vlantes & Readdy, 2017). Team cohesion and cooperation are essential to achieving success in volleyball (Suhairi & Dewi, 2021). The sport requires teamwork, technical skills, and tactics. The sport involves defensive techniques such as blocking, receiving, and attacking through serves and smashes (Soytürk, 2019).

Modern volleyball is characterised by rapid, explosive, and complex movements, as well as strategic action and situational problem-solving (Indrakasih et al., 2022). Besides mastering playing techniques, understanding fundamental aspects like posture, positioning, footwork, timing, and hand contact when playing the ball is crucial during early training, particularly for the basic smash technique (Supriatna & Suhairi, 2021). Therefore, efforts to enhance and develop volleyball learning achievements from an early age are necessary to achieve desired performance outcomes (Aguss et al., 2021). At least three forms of volleyball smashes can be identified based on the type of ball delivery in the game: open-ball, semi-ball, and full-ball (Suhairi & Dewi, 2021). The development of playing techniques can be achieved through a strong foundation of basic skills.

Introducing correct basic technical skills from an early age will help athletes master better techniques and fitness in the future, which is a prerequisite for preparing quality volleyball athletes obtained through training (Wang et al., 2023). Effective training is crucial in developing volleyball athletes' skills, especially in the smash technique. Enhancing smash skills involves repeated training with proper guidance, enhancing muscle memory, and allowing athletes to execute techniques accurately (Kasih, 2018). Effective training emphasises proper body mechanics, technique, and good physical condition, reducing the risk of injury due to incorrect movement patterns or excessive fatigue. Additionally, it focuses on long-term sustainable development, enabling athletes to excel not only at the current level but also over time in their volleyball careers.

Training in volleyball poses numerous challenges for players and teams striving to achieve their full potential. Mastering the smash technique demands precise fundamental skills in footwork, hand placement, arm motion, body rotation, and optimal contact points (Amra & Amra, 2020). Effective execution also hinges on body coordination, emphasised through diverse training variations and tools aimed at replicating actual game movements (Matušov et al., 2018). However, current limitations exist, with a dearth of personalised smashing training tools that integrate the latest technological advancements. These tools would aid athletes in familiarising themselves with fundamental movements and could be monitored through specialised application programs. Furthermore, the lack of smashing training tools suitable for home practice under technological supervision limits opportunities for individualised practice outside of club sessions.

Given the various issues outlined in the research, the researcher is interested in developing a volleyball smash training tool based on sound reactions in the form of Android to enhance the effectiveness of independent volleyball smash training. The availability of training tools that can be used for independent practice will increase the intensity of training. Repeated training, coupled with structured sets and repetitions using sound-reactive Acuspik technology, can have an impact on improving concentration and athlete responsiveness during volleyball smash practice. As stated by Scribbans et al. (2015) consistent training combined with structured sets and repetitions during each session not only improves movement quality but also leads to physical enhancement.

In the dynamic world of volleyball, effective training stands as the cornerstone for honing athletes' skills and shaping them into formidable competitors (Silva et al., 2019). Vital biomotor components like power, speed, agility, and endurance are indispensable in volleyball, where games unfold at breakneck speeds. As noted by Ramirez-Campillo et al. (2020), physical strength intertwines with these biomotor elements, forming the bedrock of athletic prowess on the court. Yet mere physical prowess isn't enough; it must be complemented by precise playing techniques, such as mastering the fundamental hit-the-ball technique (Çankaya et al., 2018). This technique not only amplifies concentration but also primes athletes to anticipate incoming balls with lightning-quick responses (Eyuboğlu et al., 2016). Embracing technology offers a promising avenue to enhance concentration and responsiveness, particularly during individual training sessions outside of regular team practices.

Technological advancement holds a significant role and has become an inseparable part of daily life (Alfahmi et al., 2022). As stated by Cardinale and Varley (2017), the need for technology to measure training aspects to enhance training recipes has been a concern of scientists for many years. This is because measurements using improved technology and equipment are essential for assessing training activities.

However, it is important to achieve a balanced integration of technology and fundamental elements of sports such as physical training, mental discipline, and hard work. The impact of technological development can be directly experienced in the fields of education and sports, whether through digitally based teaching tools or through application devices and sensors that support training, competitions, and sports learning in various disciplines (Ahdan et al., 2020). Several training tools can be developed to enhance skills in playing volleyball, including sound-reactive Android-based training tools like the volleyball smash drill.

Acuspike is a training model for the smash technique developed with the aim of mastering the correct leg and arm swing movements to maximise the potential of smashing in every volleyball game (Hujjatul et al., 2019). The use of Acuspike helps junior athletes familiarise themselves with actual smashing movements. The use of Acuspike in volleyball smash exercises has an impact on improving the basic techniques of junior volleyball smashes, starting with footwork, take-off, hand contact when hitting the ball in the air, and landing properly. This is because they get accustomed to repeatedly making hits while chasing the ball straight ahead (Sidouli, 2020). The level of participation in training, using tools specific to the discipline, is a determining factor for the activity level of schoolchildren in volleyball training (Sozen, 2012).

The development of the Acuspike volleyball smash training tool is expected to accelerate the process of mastering the proper leg and arm swing movements by providing predictable and easily adjustable targets. This includes the development of sound-reactive Android applications for controlling the Acuspike device. The use of the Acuspike tool offers an alternative to various training tools for skill development. As stated in Sidouli (2020) the use of Acuspike can be incorporated into smash training as part of developing variations. In addition to smashing training variations using a tosser, the Acuspike tool can be utilised without the need for a tosser during practice. This allows for training with a two-step approach to quick ball handling and a three-step approach for open smash drills.

The innovation of technology-enhanced tools combined with Android applications and the volleyball smash tool is part of the development of sports innovations aimed at enhancing athlete concentration and responsiveness. Thus, its use in training methods can expedite the achievement of training goals. A assisting robot (Acuspike) becomes a choice in training processes to enhance volleyball smash skills due to its mechanically based movements, which are faster and more accurate than human actions, facilitating coaches in evaluating movement skills during practice (Cirana et al., 2021). The descriptions led the researchers to intend to innovate a technology-enhanced volleyball smash drill tool based on a sound-reactive Android application. This innovation aims to provide an effective and efficient training medium for volleyball athletes' development, particularly in Indonesia. The goal is to enhance athletes' achievements and help them reach their highest potential.

The descriptions led the researchers to innovate a technology-enhanced volleyball smash drill tool based on a sound-reactive Android application. This innovation aims to provide an effective and efficient training medium for volleyball athletes' development, particularly in Indonesia. The goal is to enhance athletes' achievements and help them reach their highest potential. The provision of training tools is an effort to facilitate training centres for clubs and student development units in universities to enhance their capabilities (Ivanii et al., 2020). Therefore, the objective of creating this volleyball smash training tool is to enable players to practice individually, not relying solely on practice partners within the club but being able to train independently without requiring a tosser. This training tool can consistently and accurately deliver balls for smashing, ensuring that the availability of the ball remains constant without experiencing fatigue.

Previous research has shown that the use of Acuspike in volleyball training is claimed to improve volleyball smash skills (Sidouli, 2020), and has the potential to improve volleyball smash skills (Alamsyah et al., 2018). However, no previous research has attempted to improve volleyball smash skills using an Android-based volleyball smash training tool, and no relevant literature is available. It is hoped that this endeavour can provide direction for further research on learning volleyball smash skills and provide useful

data for designing and training volleyball smash techniques. The use of android-based volleyball smash drill training tools can be an alternative and solution to make the learning and training process more active. Make it easier for teachers or trainers to teach the stages of volleyball smash, add variations and combinations of exercises, instill motivation to learn and practice volleyball smash, train accuracy and reaction timing, and increase participant attention in volleyball learning.

Therefore, the utilisation of the Android-based Acuspike volleyball smash drill tool holds paramount importance for volleyball athletes. Its value resides in fostering the refinement of volleyball smash techniques within the volleyball learning and training environment. By employing the Android-based Acuspike, volleyball players can efficiently hone various aspects of their smash movements, encompassing step execution, take-off, arm swing, timing, interaction, and landing. The creation of the Android-based reaction drill volleyball smash tool is pivotal, particularly considering the current emphasis on leveraging technology to enhance volleyball smash timing through auditory cues in Android format. This study aims to develop an Acuspike tool integrated with a sound-reactive Android application tailored for individual volleyball smash training, with the objective of evaluating the effectiveness of this innovative approach.

## **METHOD**

### **Research Design**

The research and development method used in this study is based on the Research & Development (R&D) framework by Borg and Gall (2007), which consists of ten steps: (1) needs analysis and field observations. (2) research planning. (3) initial product development. (4) preliminary testing. (5) revision of the initial product. (6) main testing. (7) product revision. (8) main testing to assess product effectiveness. (9) final revision. and (10) dissemination and implementation. This research was conducted through several stages (road map) over a period of 3 years from 2021 to 2023, starting from needs analysis, tool development, and experimenting with the developed tool.

### **Research Subject**

The research subjects were students of the physical education study programme participating in the Volleyball Student Activity Unit (UKM) at IKIP PGRI Pontianak, totaling 60 subjects for preliminary studies and field observations. The expert development tool test involved three experts, including volleyball experts, sports biomechanics experts, and android application development experts, with indicators of (1) user comfort using the tool. (2) tool ease or practicality. (3) tool effectiveness and quality. and (4) attractiveness of tool design. The small group trial subjects consisted of 12 students participating in the volleyball UKM at IKIP PGRI Pontianak, while the large group trial subjects consisted of 40 students. The effectiveness test involved 32 individuals undergoing training using the tool without a control group (quasi-experiment) with different treatments in each group. The types of data analysis techniques used in the development of the voice-reacting acuspike volleyball smash drill training tool were quantitative and qualitative.

### **Research Procedures**

The research procedure adopts the Research and Development (R&D) method by Borg and Gall (2007), consisting of ten steps: (1) needs analysis and field observations. (2) research planning. (3) initial product development. (4) preliminary testing. (5) initial product revision. (6) main testing. (7) product revision. (8) main testing to assess product effectiveness. (9) final revision. and (10) socialisation and implementation. This research was conducted through several stages (roadmaps) over a period of 3 years from 2021 to 2023, starting from needs analysis, tool development, and experimentation with the developed tool. Quantitative data analysis used quantitative descriptive methods with percentages used in expert evaluations, small group trials, large group trials, and tool effectiveness tests. The subject data collection technique used probability sampling with a simple random sampling technique, which is the random selection of trial subjects through drawing, because all potential subjects or the entire population are homogeneous (Sugiyono, 2010). The formula used in analysing percentages is adapted from (Sudijono, 2008), as follows:

$$P = \frac{f}{N} \times 100\%$$

**Information:**

F= Total score obtained  
 N= Maximum number of scores  
 P= Percentage number (%)

The steps undertaken in this research were: **Stage I:** (1) needing analysis study with field observations; **Stage II:** (2) designing and developing the tool. (3) testing the developed model with small-scale and large-scale tests; **Stage III:** (4) assigning research subject groups to assess the effectiveness of the pre-test tool (O1). (5) administering treatment using the tool. (6) conducting post-tests (O2). (7) calculating the average pre-test and post-test scores and comparing them, and finding the difference between the two average scores through statistical methods (t-test) to determine the significant impact of the tool used.

To ensure the research runs smoothly as expected, several designs were implemented by the researcher, including: (1) conducting training for a total of 14 sessions, three times a week. Scheduled on Wednesdays, Fridays, and Sundays from 15:00 to 17:00. The warm-up duration was 20 minutes, the core training lasted for 60-80 minutes, and the cool-down lasted for 20 minutes. In the learning process, many factors influence each other, such as training methods and types, which play a crucial role in devising training session implementation strategies (Mustafa & Winarno, 2020). The utilisation of technology and media is essential in modern-day learning for use in teaching and training (Hadiana et al., 2021). This research was conducted by considering the stages of each session, starting from the preliminary phase, where students prepared themselves and the lecturer provided instructions on the material to be practiced; warming up with sufficient exercises suitable for volleyball; core activities involving athletes practicing various combinations of volleyball smash drills using the Acuspike volleyball-based android tool; break time for playing volleyball alternately; and closing with reflection and evaluation of the session, all tailored to the characteristics and physical conditions of the students. The steps for using the Acuspike tool in volleyball learning for smash drills are demonstrated in Table 1, as follows:

**Table 1. Syntax or Steps to Use Reaction-Based AcuSpike in the form of Android on Smash Volleyball Material at Each Meeting.**

No.	Activity Steps	Activity Explanation
1.	Introduction	Student activities prepare themselves at home, right down to the classroom. Learn; open and see a tutorial on how to use the tool on the material that will be practiced at the meeting. The educator, in this case the volleyball subject lecturer, provides instructions for material that will be practiced at the volleyball smash material meeting. Opening: Meetings during lectures:
2.	Opening	- Absence and appreciation - Doing static and dynamic warm-ups, and in the form of games that are in accordance with the volleyball game concept. - Explanation of today's activities Questions and answers: about the volleyball smash material that will be and has been delivered before. The supporting lecturer demonstrates the movements in volleyball in accordance with the material to be delivered. Giving assignments/exercise: practicing variations and combinations of volleyball smash skills in accordance with the existing training model in accordance with the contents of the meeting material. Good variations individually, in pairs, in groups in volleyball smash material.
3.	Main activity	Practicing variations and combinations of volleyball exercises gradually; from short-medium-long distance; and from movement; easy-medium and complex (according to the material).
4.	Rest	Playing the game "volleyball game", by strengthening volleyball skills material at each meeting in turn.

No.	Activity Steps	Activity Explanation
5.	Closing	Closing Series: - Conclusion of today's activities, and Evaluate and reflect on today's activities Closing: Closing Prayer, and Greetings

**RESULTS AND DISCUSSION**

In the learning process, there are many factors that influence each other; for example, the drill method plays an important role in preparing the strategy for implementing training session activities (Mustafa & Winarno, 2020). In today's modern era, the use of technology and media is very much needed in learning and practice (Hadiana et al., 2021). Of course, the resulting media must be in accordance with the requirements needed for volleyball learning and training. This research was conducted for 3 years in accordance with the research road map through several stages, including:

**Stage I:** A preliminary study conducted in 2020 obtained results from 60 research subjects on the importance of developing innovation in volleyball (Suhairi et al., 2020). Based on the results of the needs analysis, there are several important points that are key to the need for development to be carried out. Among other things, from the several questionnaire questions given, the following were obtained: 1) From 60 students, 100% stated that the teacher or trainer had never used the Acuspikeshmash drill training tool to assist learning or in practice. 2) From 60 students 42.67% of students stated that the media used during learning and when practicing was still not varied. 3) Out of 60 students, 100% stated that there was a need to develop drill smash training tools in order to improve volleyball skills. 4) Out of 60 students, 100% felt it was necessary to develop a volleyball smash drill training tool for the introduction of volleyball skills. The results of the same research before the importance of developing learning media and volleyball smash training equipment were also conveyed (Komalasari & Rahmat, 2018).

**Stage II:** The equipment development research in 2021 conducted further investigation using a sound-reactive Android-based volleyball smash training tool development method. The development of volleyball smash training equipment resulted in a viable tool. The process of developing this volleyball smash drill tool went through several stages of development. The creation of the acuspikeshmash tool began with the development of the framework from 2021 to 2022, and in 2023, the development took the form of a sound application. The development adoption followed the Brog and Gall approach, involving a preliminary study, expert validation, small-scale testing, large-scale testing, and effectiveness evaluation through experimental testing. The assessment results from volleyball expert validators obtained an average score of 84.00%, meeting the criteria of being suitable. The biomechanics expert validator yielded an average score of 94.67% with the criteria of being suitable, and the programming expert validator achieved an average score of 94.67% with the criteria of being suitable. The average overall score was 86.67%, meeting the criteria of being suitable. The small-group testing with 12 subjects achieved a percentage of 85.97% with the criteria of being appropriate, and the large-group testing with 40 subjects obtained a percentage of 90.42% with the suitable category.

The results of the small group trials were obtained based on the responses of students who took part in volleyball UKM, which consisted of four main variables: comfort, ease of components, tool quality, and attractive appearance. Small-group trials were conducted on November 20, 2021. In the trial, students used the volleyball smash drill training tool. After students used the volleyball smash drill training tool, they filled out a questionnaire regarding the content and quality of the volleyball smash drill training tool that had been developed. The following is the trial data obtained from small groups on the aspects assessed in the table, as follows:

**Table 2. Trial Data Obtained from a Small Group Development of the Android-based Acuspik Smash Volleyball Drill Training Tool**

No.	Rated Aspect	Score Obtained	Maximum Score	Persentase (%)	Category
1.	Convenience of using the exercise tool	253	300	84.33%	worthy
2.	Ease of training tool components	99	120	82.50%	worthy
3.	The quality of drill training tools	161	180	89.44%	worthy
4.	Attractive design	106	120	88.33%	worthy
<b>Total Score</b>		<b>619</b>	<b>720</b>	<b>85.97%</b>	<b>worthy</b>

Of the 12 items assessed, the assessment aspect included the feasible criteria. As for the assessment based on each indicator, namely in terms of the comfort of using the tool, namely 84.33%, the ease of the components of the training equipment, namely 82.50%, the quality of the volleyball smash drill training tool, 89.44%, and the design of the tool that attracts attention, namely 88.33%, Overall, the total average score is 85.97%, which is included in the “decent” category after being converted with a Likert scale. After conducting small-group trials, the researchers then conducted large-group trials. The large group trial was taken from 40 IKIP-PGRI Pontianak students with volleyball UKM respondents. The large group trial was conducted on November 27, 2021. In the large group trial, the researcher explained how the tool worked and how to use the drill smash volleyball training tool. The researcher then arranged the framework while being watched by students to find out how to assemble the tool and how to operate it before using the drill smash volleyball training tool. Then students use the volleyball smash drill training tool alternately. After using the volleyball smash drill training tool, students will fill out the questionnaire that has been given to assess the performance of the volleyball smash drill training tool. The following is the trial data obtained from small groups on the aspects assessed in the following table:

**Table 3. Trial Data Obtained from the Large Group Development of the Android-Based Acuspik Smash Volleyball Training Tool**

No.	Rated aspect	Score obtained	Maximum Score	Persentase (%)	Category
1.	Convenience of using the exercise tool	901	1000	90.10%	worthy
2.	Ease of training tool components	356	400	89.00%	worthy
3.	The quality of drill training tools	555	600	92.50%	worthy
4.	Attractive design	358	400	89.50%	worthy
<b>Total Score</b>		<b>2170</b>	<b>2400</b>	<b>90.42%</b>	<b>worthy</b>

Of the 12 items that are overall included in the “appropriate” category, As for the assessment based on each indicator, namely in terms of the convenience of using the tool, namely 90.10%, the ease of the components of the training equipment, namely 89.00%, the quality of the volleyball smash drill training tool, namely 92.50%, and the design of the tool that attracts attention, namely 89.50% Overall, the average number of scores is 90.42%, which is included in the “decent” category after being converted with a Likert scale. After being converted with a Likert scale.

Thus, it can be concluded that the innovation of developing a volleyball smash drill tool equipped with reaction settings in the form of an Android application is feasible to use as a tool to improve volleyball smash skills, especially for individual training (Suhairi & Arifin, 2022). A reaction-based volleyball smash training tool in the form of sound in Android form makes it easier for coaches to provide training and provide consistent and measurable training and targets for players to perfect their smash technique (Saputra, 2022). Previous research carried out innovations in volleyball smash training tools to obtain an increase in volleyball smash abilities, but only for open smashes (Noprian et al., 2020). This research is a differentiator from previous research conducted, where the innovation developed by the research considers the speed of reaction in the development of volleyball smash drill tools so that they can be used in training for open smash techniques, semi smashes, and full smashes.

The result of the product being developed is the development of a volleyball smash drill tool that is equipped with a reaction speed setting on the Android application. This tool consists of two components:

- The frame component of the volleyball smash drill tool functions to regulate the course of the ball in the drill, which can be adjusted to the height of the ball and is equipped with a Bluetooth speaker for sound. The volleyball smash drill tool is made with the following specifications:
  - a. Ball Basket: The size of the upper section is 70x70 cm. The size of the lower section is 30x30 cm, with a basket height of 75 cm.
  - b. Ball Track Rail: The length of the ball-running rail is 120 cm. The width of the ball-running rail is 22 cm.
  - c. Ball Clamp, length and width 50 cm, using a 2x2 cm galvanised iron frame. covered in foam and synthetic leather on the outside.
  - d. Support Pole: The length of the ball-running rail is 120 cm. The width of the ball-running rail is 22 cm.
  - e. Pole Support Specifications Using 6x6 cm galvanised iron frame material. Support height: 150-250 cm.
  - f. Specifications for ballast and spiker boxes: 3mm plywood, 50 cm high. Length: 30 cm, Width: 80 cm. Three speakers are equipped with a 12-ampere battery.
- Bluetooth remote voice reaction component based on an Android application. Serves to regulate the speed and number of repetitions of the volleyball smash on the drill training tool. There are several mode options, namely STEP 1 (4 seconds, 5 repetitions), STEP 2 (6 seconds, 5 repetitions), STEP 3 (7 seconds, 5 repetitions), and STEP 4 (10 seconds, 5 repetitions), which are found on the menu display on the Android application. After selecting the mode and the start button, a voice command will be sent to the volleyball smash drill tool component, which is equipped with a Bluetooth speaker. The time setting can be selected according to the user's needs in the volleyball smash drill. When you want to stop before the repetition is complete, simply click again on the start button, and the settings will reset back to their initial settings (Suhairi & Arifin, 2022). The following is an image of the resulting product:

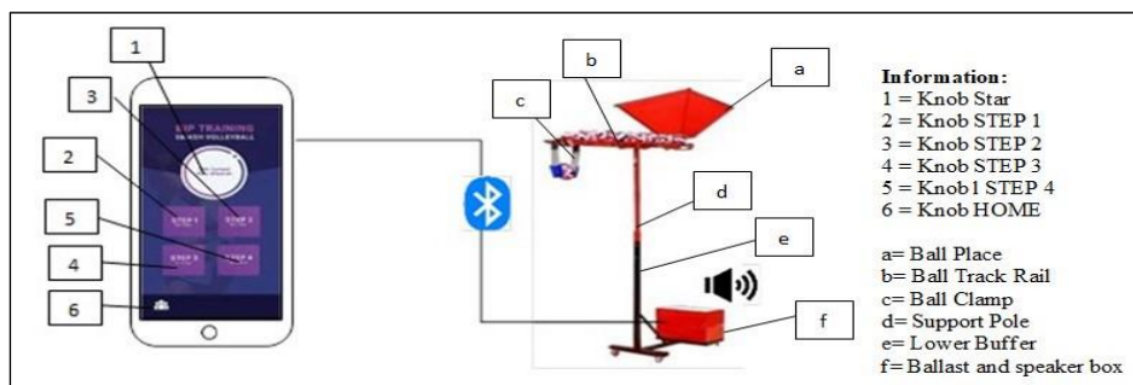


Figure 1. The Final Product for the Development of a Volleyball Drill Smash Drill Based on Sound Reactions in the Form of Android (Suhairi & Arifin, 2022)

As for previous research, the development of an individual volleyball smash drill training tool was in the form of a tool frame, not equipped with sound reactions in the form of an android. It is intended for individual practice on steps, hand swings, and hand contact.

The researcher developed a frame product for a volleyball smash drill training tool based on sound reactions from the tool in the form of an android as a novelty. Usefulness goes beyond practicing steps, arm swings, and hand tools. The use of voice reactions can help train the speed of smash motion reactions if done according to voice commands that have been p4:arranged through the Android application. Reaction speed is important in carrying out a smash because of the type of ball; the height of the ball from the setter varies to

create many points of attack and attack the opposing team to anticipate attacks (Afonso & Mesquita, 2011). The variation of the ball from the setter makes the direction of the ball difficult for opposing players to bend, so blockers are late for a guard (Afonso & Mesquita, 2011).

**Stage III:** To improve technical skills in playing volleyball, training and evaluation must be carried out regularly and systematically so that the coach knows the strengths and weaknesses of the technique (Indrakasih et al., 2022). At this stage, the use of the volleyball smash drill training tool is carried out using the quasi-experimental method. This study uses two variables. The dependent variable is the ability to smash in volleyball, while the independent variable is training using a volleyball smash drill equipped with voice reactions in the form of an android. The results of the volleyball smash used for analysis are the standard score data between the targets of 10 volleyball smashes, namely 5 diagonal smashes and 5 frontal smashes by players who take part in training Nurhasan (Candra & Henjilito, 2018). From the results of the initial and final tests, we can find data from the exercises carried out. The results of the volleyball smash ability were processed after the treatment was carried out.

Implementation did every smash, and the sample did ten smashes. If a bait that is accurate three times in a row is not smashed by the smasher, then it is considered a failure to do the smashes. Smash technique: according to the rules of the game, all violations committed are scored 0. If the destroyed ball falls on the boundary line between two or more lines in the target position, then the highest score is taken as the value of the smash. The final score of each player who did the smash is the sum of ten smashes Nurhasan in (Alamsyah et al., 2020).

Based on the results of the initial test of the volleyball smash ability of 32 volleyball players who took part in UKM at IKIP PGRI Pontianak before being given the volleyball smash drill treatment using an acusprike based on sound reactions in the form of android, the mean or average was 16.78, the standard deviation was 2.1467, and the highest score was obtained at 18 and the lowest score was 9 points. The pre-test here is given to get the initial data before it is given treatment and to find out to what extent the athlete's skill in doing the smash open.

The author will provide treatment regarding open smash by using drill tools when smashing athletes by giving 14 meetings inside. This research is to determine the development of the ability to smash open when using the Acusprike drill tool.

A post-test was conducted to find out whether, after being given treatment, there is a significant increase in the yield of using the Acusprike drill tool against smash open effectiveness. If there is any improvement, then this research was successful and can be applied by coaches to athletes in practice smash open. The results of 32 students who took part in the volleyball UKM obtained the final test results for volleyball smash ability after being treated with a drill using an Acusprike equipped with sound in the form of an android. The average was 17.43, the standard deviation was 2.66, and the highest score was 22 and the lowest score was 11 points. While the measurement distance is 9, the details can be seen in the following table:

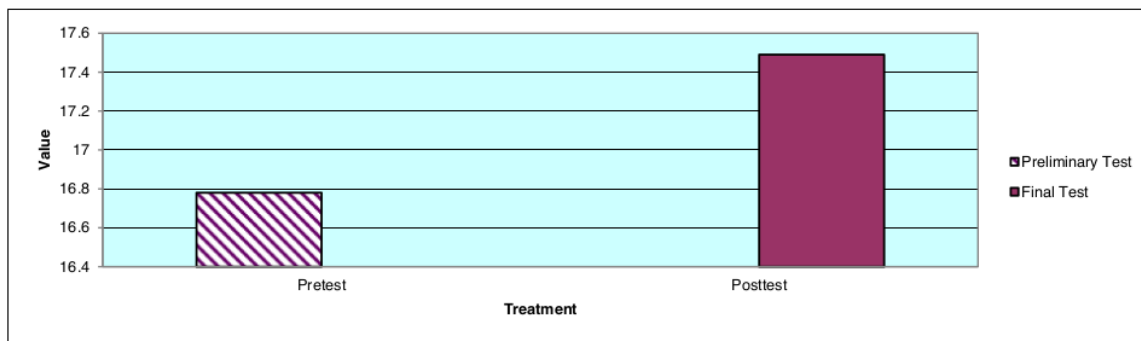
**Table 4. Distribution of Pretest-Posttest Data on the Ability to Smash Volleyball after the Treatment of Using the Acusike Smash Volleyball Training Tool**

Smash Drill with Acusprike	Lowest value	The highest score	Average	Standard Deviation
Pretest	9	18	16.78	2.15
Posttest	11	22	17.43	2.66

Based on Table 4, the results of the smash-open It is known that in data collection, both (posttest) athletes are better than today's initial data collection (pretest). So it can be concluded that the hypothesis reads, "There is an increase in the ability open smash through the drill Acusprike smash volleyball." One of the most basic improvements in volleyball smash skills is the introduction of smash steps related to reaction speed and timeliness when hitting the ball in the air. Several factors affect the smash attack, including physicality, basic skills, reaction speed, and time when hitting the ball in the air (Aguss et al., 2021). In

addition to supporting equipment, the use of the drill system in volleyball smash training sessions tends to affect the improvement of basic techniques in volleyball games (Susanto et al., 2021).

Improving smash skills will not improve without repeated practice and seriousness in practicing. The use of a drill using an Acuspikie provides flexibility in smash movements, specifically for novice athletes in practicing the basic steps, repulsion, accuracy of hand swings, and accuracy of hitting the ball with the palm of the hand. Considering that in volleyball there are several smash techniques that are influenced by speed and reaction. Each ball bait has a different reaction speed in volleyball (Widodo et al., 2022). The effectiveness of using the reaction-based drill smash tool can be seen in Figure 2.



**Figure 2. Average Distribution of Pretest-Posttest Data on the Ability to Smash Volleyball after the Treatment of Using the Acuspikie Smash Volleyball Training Tool**

This research has previously carried out an analysis test with a data normality test to see whether the data from the variables studied is normal or not. Based on the results of the liliform test, namely  $Lo < Lt \alpha = 0.05$ , if  $Lo$  is smaller than  $Lt$ , then both variables are normally distributed. Then the homogeneity test was analysed with the F test statistic using degrees of freedom and a significance level of 0.05 in the F distribution.  $F_{count}$  was obtained at  $0.93 < F_{table}$  was obtained at 2.51, so it was concluded that this sample group was homogeneous.

The hypothesis of this study is that the sound reaction-based Acuspikie drill exercise in the form of an Android application influences the volleyball smash ability. The results of testing the hypothesis turned out that the acuspikie drill exercise based on sound reactions in the form of an android had a significant impact on the ability to smash volleyball at the Volleyball UKM IKIP PGRI Pontianak. The Acuspikie training model will be more optimal for athletes who have high power, while manual spike drilling will be more optimal for athletes who have low power (Sidouli, 2020).

**Table 5. Pretest and Posttest Differences in Volleyball Smash Ability.**

df	t count	t table	Conclusion
31	13.04	2.040	Significant

From the table above, it is evident that the calculated t-value is 13.04, which is greater than the critical value of 2.040. Therefore, it can be concluded that training using the Acuspikie equipped with a sound-reactive Android application significantly influences the volleyball smash ability.

The volleyball Acuspikie developed is a follow-up development that has been carried out for 3 years. In the first year of 2021, researchers conducted a preliminary study by meeting several volleyball coaching centres in the city of Pontianak and several academics who were concentrating on teaching volleyball courses during a pandemic. In 2022, researchers are developing a volleyball smash drill training tool intended for junior athletes and students who follow the basic volleyball motion, which produces a volleyball smash drill training tool called an Acuspikie. In 2023, the researchers carried out further development by developing a volleyball Acuspikie tool that had been developed by adding a loudspeaker to the tool and a voice command signal in the form of an android that could be connected to a volleyball

Acuspikes via Bluetooth, which can adjust the speed of each repetition and set to increase the concentration and response of athletes in carrying out the volleyball smash movement, which gives the right timing impact when hitting in the air. The development of a sound-based Acuspikes is a development that has not existed before, which is the novelty of this research. The resulting volleyball Acuspikes can be used to practice independently at home without being accompanied by a tosser or feeder in carrying out the smash motion. Athletes who practice using the sound reaction-based Acuspikes also have an impact on the response when taking a stance against the arrival of the ball with the right timing.

The use of the sound reaction-based volleyball Acuspikes tool is carried out with the consideration that this tool is specifically for independent training. So that in its use, the user does the exercise without being serious in demonstrating the smash motion during practice, due to practicing without the direction and supervision of a coach and friends. The use of sound reactions on the Acuspikes is an alternative as a companion when practicing volleyball smashes independently. The use of voice reactions in the form of Android is a consideration because it is relatively easy to use, considering that all people already have mobile phones and this application device can be easily installed by users. The importance of sound in giving signals and cues to make moves when practicing is a companion technology for doing moves to practice volleyball smashes using an Acuspikes. So that the user of the tool can perform movements with regular and measurable repetitions and set durations even though they practice individually with the help of sound settings that are set before starting to use the Acuspikes. The Acuspikes used can improve basic volleyball smash movement skills, especially the smash steps, repulsion, hand swings, and palm contact with the ball. The volleyball smash drill tool is an option in the training process *in an effort to improve volleyball smash skills* because *the* resulting movements are machine-based, so they are faster and disperse humans accurately, making it easier for coaches to evaluate movement skills while practicing (Indrakasih et al., 2022).

The training model for the volleyball smash technique, represented by the Acuspikes volleyball, was developed with the aim of serving as a companion for individual training, enabling players to master the volleyball smash skills, particularly proper footwork and arm swing, in order to maximise the potential of each player's smash hit. Volleyball smash training tools are highly beneficial for enhancing smash skills, especially in terms of mastering footwork and timing during striking (Mustofa et al., 2022). When executing a smash, players must possess good coordination, including timing control, jumping technique, footwork, eye focus, and hand positioning, to direct the smash according to their capabilities (Pranopik, 2017). The ability to direct the ball can be achieved by athletes who possess solid fundamental techniques, quick reaction times, and precise timing. Proper timing is also vital, as it ensures accurate timing while leading the ball to its maximum height. The skill of ball direction is attainable for athletes with sound basic techniques, fast reaction times, and good timing. Accurate timing is established when the reaction precisely leads the ball's trajectory to its highest point. The concept of timing is focused on achieving the correct moment, whereas accuracy is centred around proficiency. Effective timing ensures that the hand's contact with the ball aligns with the intended outcome, resulting in an effective movement (Anum & Romi, 2019). Fundamental smash movements, including initial steps, take-off, arm swing, hand-ball contact, and proper timing, can be trained using the Acuspikes volleyball tool in combination with consistent practice.

Having strong smash skills makes it easier to score points in every match and poses a challenge for opponents to organise their attacks. The importance of enhancing hits in volleyball to gain points is highlighted (Sato et al., 2017). Its incorporation into training methods can expedite the achievement of training objectives (Hasyim et al., 2023). The improvement of basic volleyball smash techniques is influenced not only by the use of the Acuspikes volleyball tool but also by regular practice. The training referred to here involves repetitive movements that lead to the automation of desired volleyball smash techniques (Fanani, 2020). The regularity of training impacts not only the enhancement of fundamental techniques but also the elevation of physical activity. Repeated training involving physical components contributes to fitness and movement skills (Wang et al., 2022). Physical components can be heightened due to continuous and progressively challenging training, leading to improved movement capabilities (Marques

et al., 2019). The use of drill systems in training sessions tends to have an effect on enhancing fundamental techniques in volleyball (Palao & Valadés, 2012).

Repeated training, accompanied by set arrangements and repetitions in each meeting, not only refines movements but also fosters physical improvement (Raleigh et al., 2016). Physical improvement enhances movement activity during training (Bompa et al., 2015), considering that the smash technique requires leg power, flexibility, speed, strength, agility, and coordination. Acuspikes smash training, where the ball is dynamically and flexibly suspended, allows for adjusting the ball's height according to the athlete's maximum reach. Proper basic techniques and trained physical components facilitate organising attacks during gameplay, as there are no hindrances, including physical fitness, and they display harmonious movement coordination (Mahedero et al., 2014). Typically, practicing various techniques and utilising different training and learning media helps individuals become accustomed to deciding within seconds when to attack and score points (Ilić et al., 2023). The use of varied training and learning media makes the game enjoyable (Panel et al., 2022). Improving the smash movement ability can be done with additional exercises independently using a volleyball Acuspikes. Mastery of basic techniques in volleyball games is also influenced by physical components, and techniques in the game are also influenced by physical abilities.

## CONCLUSION

The results of this research can be concluded that the product of volleyball drill training equipment based on reaction is a developed product for practicing volleyball smashes independently. The novelty, innovation, and creative usage of the Acuspikes development with sound reaction are training tools for smash drills that have been equipped with sound reactions in an Android form, significantly influencing the ability of volleyball players to perform smashes when practicing independently. Through the use of sound-reactive Acuspikes during training, it can enhance the fundamental skills of executing volleyball smash movements earnestly, training precision in hand-ball contact, timing when anticipating jumping movements, and the ball's position when struck in the air.

The contribution of this research impacts the innovation of developing volleyball smash training equipment, which affects players with strong determination. This, in turn, leads to results such as improved smashing performance in volleyball games. With the Acuspikes product, both junior athletes and students are expected to practice volleyball smashes independently, both during and outside formal training and learning sessions. Furthermore, it can support success in volleyball by enhancing individual effectiveness in the game. The use of Acuspikes with sound signals also potentially increases user satisfaction in practicing independent volleyball smashes, as the voice commands in the drill tool motivate users to execute volleyball smash movements.

Based on the conducted analysis, it can be inferred that sound-reactive Acuspikes training, in the form of an Android application, influences volleyball smash abilities. However, it's important to acknowledge the limitations of this study, as it used a relatively small sample size, particularly focusing only on volleyball athletes. Additionally, this research was conducted solely at one university in Pontianak City. Future research could expand to subjects from various regions, volleyball clubs, and different universities.

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## CONFLICT OF INTEREST

The authors state there is no conflict of interest.

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