

Developing a learning model on basic techniques forehand and backhand volley based on integrated training approach for junior tennis players aged 8-12 years

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Abstract:

The basic forehand and backhand volley techniques are as important as the basic serve, forehand and backhand groundstroke techniques in tennis, as a weapon to score points in singles and doubles games. However, teachers/coaches often find it difficult to teach an easy method in basic forehand and backhand volley techniques for children. This study aims to develop a learning model for basic forehand and backhand volley techniques based on an integrated training of Cognitive, Psychology, and Skill (CPS) to provide a better learning for junior tennis players aged 8-12 years. The research design used research and development method of 4D models, Define, Design, Development, and Disseminate using a quantitative and qualitative approach (mixed method). Quantitative data collection instruments were obtained from the results of pretest and posttest scores, while qualitative data were taken from questionnaires and interviews. The instruments was developed and validated using Content Validity Ratio analysis, Consistency Alpha Cronbach, and Anova-General Multifacet Model. The results shows that the provision of pretest and posttest multiple choice questions, observation sheets on a psychological approach, stages of training models based on skills approach, and model basic training exercises based on an integrated training approach are very helpful in the process of setting the knowledge and understanding of the mastery of basic techniques forehand and backhand volley for junior players ages 8-12. The instruments validation resulted in an excellent content validity/CVR and high reliability coefficient/ICC. Thus, the integrated training of CPS can be applied to optimize the learning of basic forehand and backhand volley for junior tennis players aged 8-12 years.

Key Words: Tennis teaching, Integrated CPS, Tennis cognitive, Tennis psychology, Tennis skill, Junior tennis

Introduction

In tennis, there are some basic techniques that must be mastered in training children, i.e. service, groundstrokes (forehand groundstroke and backhand), and volley (forehand and backhand). These basic techniques are the dominant techniques used in the real tennis game, therefore the techniques have to be learned, understood, and mastered since the beginning of learning tennis, including those aged 8-12 years. As one of the key technique, forehand and backhand volley skills play an important role in getting points while playing tennis game. Statistical records show that in international matches (ATP Tour Series, Grand Slam Tournaments, Davis Cup, Federation Cup) nowadays, forehand and backhand volleys are having the same contribution as groundstroke techniques (Rutherford, 2021). In doubles games, volleys are even considered more important than groundstrokes since the majority of points are obtained from forehand and backhand volleys. Hsiao, et.al., (2008) stated that volley techniques like a blow, where intensive and appropriate training will develop the technique to become a gun to deadly shot the opponents in a match. The development of tennis training method for children especially in volley techniques is necessary for preparing a professional tennis player.

The weaknesses of teaching volley techniques for young age players can be found from several facts, such as the lack of teachers/coaches knowledge and understanding in teaching basic forehand and backhand volley techniques according to the trained child's ability level, coaches often find it difficult to teach the two basic volley techniques, the teaching method is still using conventional methods, and the lack of innovation in learning approaches. These facts lead the teaching and learning process is less than optimal and cause boredom of the training children in practicing.

The same phenomena were also found at several tennis associations and schools in Yogyakarta Province, Indonesia. It was found that several coaches teaching forehand and backhand volley techniques without adequate knowledge to training children or providing examples of movement visualization, giving monotonous drills (providing the same drill model without paying attention to the actual tennis playing situation) from the beginning to the end of the exercise, using the model the same drill without differentiating the level of ability of the trainees.

The need analysis that conducted by questionnaires and interviews the teachers/coaches in schools/tennis clubs in Yogyakarta Province, found that a new approach is needed in teaching the basic techniques of volley in line with the characteristics of the two basic techniques of volleyball, according the actual situation in playing tennis. It is also important to integrate cognitive abilities (through verbal explanations and stages of basic technique motion elements), technique application skills and tactics, and psychological aspects (decision making in teaching forehand and backhand volleyball). The selection and the use of proper teaching approach in tennis training lead to the optimal and maximal result in tennis mastering (Unierzyski, 2007). It is also necessary to develop a more effective and efficient teaching approach in accordance with the demands of the sport characteristics and the ability level of the trainee. Zetoua, et al. (2014) reported that training 12-year-old tennis players based on real tennis game situations together with motor skills development at the same time can be an instill simple tactics and strategies in improving the trainee's knowledge (cognitive) and abilities (skills).

Psychological aspect is also found having high contribution and crucial role in tennis player's success, especially at the higher performance level (Weinberg, 1988; ElferinkGemser et al., 2004; van Yperen, 2009). After the Australian Open 2015, Novak Djokovic stated that "In these particular matches and circumstances, psychological skills probably plays the most important role. In winning those matches, you need to be able to find that inner strength, mental, physical, emotional, especially when you're down in the finals and when you're playing a top rival". Some psychological skills have been studied extensively in different kinds of sports (Howers et al., 2017; Bull et al., 2005; Gucciardi et al., 2008; Jones et al., 2002, 2007; Weinberg et al., 2009), mostly reported that psychological skills as the natural or developed skills enabled an athlete to consistently in remaining determined, focused, confident and in control of emotions better than opponents. However, this psychological aspect were not highly considered yet in teaching volley techniques for the young tennis player's by teachers/coaches, especially in Yogyakarta Province, instead of cognitive and motoric skills.

This article reported the development of Integrated Training Approach that combines cognitive abilities, motor skills, and psychological aspects (CPS) in learning the basic volley techniques of tennis. Through the use of an integrated training approach in the training process, it is hoped that learning will be more interesting, make it easier for children to train in learning, be fun/exciting, generate enthusiasm for training, and create activity for the children to train. It is also hoped that the learning/training process carried out can run effectively to create exercises that are expected to be in accordance with the actual tennis game situation. The developed method was specifically directed for junior tennis players aged 8-12 years.

Material & Methods

The research on developing the tennis playing skills adopted the development research model of Sugiyono (2019) with slight modification through 4D model. The research sample are students of tennis associations or schools aged 8-12 years in the Special Region of Yogyakarta. The approach used in this research is a quantitative and qualitative approach (mixed method). Quantitative data was obtained from the results of the pre-test and post-test scores for beginner level volley forehand and backhand tests compiled by International Tennis Number from ITF (2004). Qualitative data were taken using a questionnaire and interviews. The research was done through following steps:

Define

This step was performed to identify problems and gather primary data collected using questionnaires and interviews to teachers and coaches of young player age 8-12 years, also observing the training process from several tennis schools/clubs in Province Yogyakarta. For qualitative data use a questionnaire and interviews. Respondents involved in this study consisted of: (1) material experts, (2) media experts, (3) coaches of tennis associations or schools, and (4) trainees. The results of the next study were analyzed and described for easy understanding. The results of preliminary study showed that the teacher train without giving knowledge on how to handle the forehand and backhand volley, how give a respond to the volley and back to ready position, performing volley without swing but only block the ball (cognitive aspect), etc. The data also showed that low fighting spirit while facing volley and less confident when doing volley (psychology aspect). Skills when doing volley, anticipatory and perceptual abilities were still wrong, the executions are often wrong, the teacher are not usually evaluate the trainee's action so there is lack of feedback.

Design

Based on the collected data, the research performed to design a learning method of teaching tennis in volley techniques by combining the integrated approach consists of cognitive, psychology, and skill aspects (CPS). The development of teaching module was done using several indicators as constructed by previous research (Ngatman, 2019), which then resulted in instrument for teaching basic technique of volley in tennis sport for kids aged 8-12 years. The instruments were then validated by experts, consists of:

- a. Content validity testing is carried out through the assessment of tennis experts (subjective rating expert judgment) using the CVR (Content Validity Ratio) formula. The CVR formula is as follows (Mardapi, 2017).
- b. Testing the reliability of the model using the Consistency Alpha Cronbach formula. (Mardapi, 2017)

- c. Analysis of inter-rater reliability (inter-tester reliability) using the Anova-General Multifacet Model (Currel et al., 2008).

Development

This step was done to develop and revise the teaching instrument based on the comments from expert. The development stage also included field application in limited population to obtain another feedback from experts. The final revision was performed to result final developed teaching instruments.

4. Disseminate, the application of final developed teaching instruments in a bigger population to analyze the effectiveness of the instrument's to master the volley techniques of junior player aged 8-12 years.

Results

After going through the all 4D stages along with in-depth development steps, it is successfully developed learning models for forehand and backhand volley basic fechniques tennis based on the "Integrated Training" approach for junior tennis aged 8-12 years old. The results consists of: (1) assessment instruments for basic forehand and backhand volley techniques to measure children's knowledge level/based on a cognitive approach (2) observation sheets for basic forehand and backhand volley techniques based on a psychological approach (3) stages of training models for basic forehand and backhand volley techniques based on approaches skills (4) training model for forehand and backhand volley basic techniques based on an integrated training approach that has excellent content validity (CVR) and high reliability coefficient (ICC).

Development of Forehand and Backhand Volley Basic Technique Learning Models Based on Cognitive Approach.

The development of a forehand and backhand volley basic technique model based on a cognitive approach using a test instrument in the form of 20 multiple choice questions. This instrument has previously been validated by experts in tests, measurements, and evaluations. This test is given at the beginning before the development of the model and at the end after the development of the learning model for basic forehand and backhand volley based on integrated training for junior tennis players aged 8-12 years.

The subjects involved to work on the questions amounted to 25 junior tennis players aged 8-12 years in 5 districts/cities in DIY Province. This step aims to see if there is a deposition of knowledge and understanding of junior tennis players aged 8-12 years on the basic techniques of forehand and backhand volley in tennis. The results of the test using the pretest and posttest turned out to be an increase in knowledge and understanding of the basic techniques of forehand and backhand volley. The reliability coefficient = 0.924. Thus, it means that giving pretest and posttest is very helpful in the process of depositing knowledge and understanding of trained children in doing basic forehand and backhand volley techniques.

Observation Sheet for Forehand and Backhand Volley Basic Techniques Based on Psychology Approach.

Successfully developed four observation sheets of basic forehand and backhand volley techniques based on a psychological approach. The four observation sheets for basic forehand and backhand volley techniques are the following reasons:

- a. Instructions for Filling Out and Decision-Making Observation Sheets when doing forehand and backhand volley in playing Tennis.
- b. Instructions for Filling Out and Decision-Making Observation Sheets when doing forehand and backhand volley in playing Tennis.
- c. Instructions for filling out the Forehand and Backhand Volley Basic Techniques Observation Sheet (Execution and Feedback Stage).
- d. Instructions for Filling Out Attitudes and Behavioral Factors Observation Sheet.

Development of Forehand and Backhand Volley Basic Technique Learning Models Based on Skill Approach.

The development of a skill-based basic forehand and backhand volley training model consists of eight stages which contain: (1) Basic Racket Holding Exercises for Forehand and Backhand Volley (2) Ball Catching Exercises (3) Shadow Exercises for Hitting Forehand and Backhand Volley (4) Forehand and Backhand Volley Hitting Practice Using Racket, Without Ball (5) Forehand and Backhand Volley Hitting Practice Using Racket and Ball (6) Forehand and Backhand Volley Hitting in Pairs in the Service Box area (7) Hitting Forehand Volley and Backhand in Pairs from the Service Line, and (8) Hitting Forehand and Backhand Volley in Pairs from the Backline (one stands in front of the net to do volley forehand and backhand, and one to groundstroke alternately). From the eight stages of the basic technique learning model, each stage of the developed learning model has different training objectives and the end goal of the developed learning model is to teach/practice basic forehand and backhand volley techniques that are easy to do for junior tennis players aged 8-12 years.

The draft of the forehand and backhand volley basic technique learning model based on the skill approach that has been compiled was then validated by 5 tennis experts to receive feedback and suggestions. The results of the assessment from the experts are in Table 1.

Table 1. Expert Validation Test Assessment Results

Expert	Score	Information
1	4	Good
2	3	Good
3	4	Good
4	3	Good
5	4	Good

The results of the validation carried out by the experts gave a good value to the draft learning model that was developed based on skills. The assessment of the five coaches of tennis associations/schools in DIY on the basic forehand and backhand volley learning model developed was carried out by choosing 3 alternative answers consisting of: very important, appropriate, and not important.

The results of content validity from the five coaches of tennis associations/schools can be found in Table 2.

Table 2. Expert Validation Test Assessment Results

Forehand and Backhand Volley Basic Technique Learning Model Based on Integrated Training Approach Developed for Junior Tennis Players Aged 8-12 Years								
	Basic Movement Stage I	Basic Movement Stage II	Basic Movement Stage III	Basic Movement Stage IV	Basic Movement Stage V	Basic Movement Stage VI	Basic Movement Stage VII	Basic Movement Stage VIII
DMS	Important	Important	Important	Important	Important	Not Important	Important	Important
ALM	Important	Important	Important	Important	Important	Important	Important	Important
JKS	Important	Important	Important	Important	Important	Important	Important	Not Important
STR	Important	Important	Important	Important	Important	Important	Not Important	Important
BSW	Important	Important	Important	Important	Important	Important	Important	Important

Based on expert judgment, 5 tennis trainers/teachers stated that the Learning Model of Basic Movement Stages I, II, III, IV, and V stated it was important. The basic technique learning model VI, VII, and VIII results showed that four trainers/teachers stated it was important, whereas one person stated not important. The results of the calculation of the Content Validity CVR are shown in Table 3.

Table 3. CVR Calculation Results Content Validity Development of Learning Model Basic Techniques Forehand and Backhand Groundstroke

Stages of Learning Basic Forehand and Backhand Volley Techniques	Forehand and Backhand Volley Basic Technique Learning Model Based on Integrated Training/CPS Approach Developed for Junior Tennis Players Age 8-12 Years	Content Validity Coefficient (CVR)
I.	Basic Racket Holding Exercises for Forehand and Backhand Volley	1.00
II.	Practice Catching the Ball	1.00
III.	Shadow Exercises Forehand and Backhand Volley Hitting Movement	1.00
IV.	Forehand and Backhand Volley Hitting Practice using a Racket, without the Ball	1.00
V.	Forehand and Backhand Volley Hitting Practice using Racket and Ball	1.00
VI.	Hitting Forehand and Backhand Volley in Pairs in the Service Box	0.60
VII.	Hitting Forehand and Backhand Volley in Pairs from the Service Line	0.60
VIII.	Hitting Forehand and Backhand Volley in Pairs from the Backline (one stands in front of the net for forehand/backhand volleys, and one alternate groundstrokes).	0.60

Based on Table 3 above, it can be stated that the developed model has a very good content validity coefficient. This is due to the fact that the CVR coefficient values for all of the development of learning models for basic forehand and backhand volley in the training models: I, II, III, IV, V, VI, VII, and VIII are greater than 0.50. Thus, the learning models in stages I through VIII can be used as standard models for training/teaching forehand and backhand volley for junior tennis players aged 8 to 12.

The results of the inter-rater reliability of the Skill-Based Forehand and Backhand Groundstroke Basic Movement Model Development are presented in Table 4.

Table 4. Results of Inter-Rater Reliability for Development of Learning Models for Forehand and Backhand Volley Basic Techniques

Stages of Learning Basic Forehand and Backhand Volley Techniques	Forehand and Backhand Volley Model Based on Integrated Training Approach Developed for Junior Tennis Players Age 8-12 Years	ICC Reliability Coefficient
I.	Basic Exercises Holding a Racket for Forehand and Backhand Volley	0.901
II.	Practice Catching the Ball	0.915
III.	Shadow Exercises Forehand and Backhand Volley Hitting Movement	0.922
IV.	Forehand and Backhand Volley Hitting Practice Using a Racket, Without the Ball	0.931
V.	Forehand and Backhand Volley Hitting Practice using Racket and Ball	0.925
VI.	Hitting Forehand and Backhand Volley in Pairs in the Service Box	0.914
VII.	Hitting Forehand and Backhand Volley in Pairs from the Service Line	0.906
VIII.	Hitting Forehand and Backhand Volley in Pairs from the Baseline (one stands in front of the net for forehand/backhand volleys, and one alternate groundstrokes).	0.902

Based on Table 4, it is clear that the developed model has a high level of inter-rater reliability. As a result, the developed learning model product can be used as a standard model for teaching basic forehand and backhand volley techniques to junior tennis players aged 8 to 12 years.

Discussion

The development of a learning model for basic techniques of forehand and backhand volleyball based on an integrated training approach for junior tennis players aged 8-12 years has a very good impact on the mastery of basic techniques of forehand and backhand volleyball. The learning approach model by integrating cognitive, psychology and skill turns out to make it easier to master the basic techniques of forehand and backhand volleyball for junior tennis players aged 8-12 years.

Giving multiple choice tests at the beginning before the development of the model and after the development of the model provides deposition of knowledge and understanding of junior tennis players aged 8-12 years on the mastery of basic techniques of forehand volleyball and backhand volleyball in tennis games. The results of the reliability coefficient of the level of knowledge and understanding of the basic techniques of forehand volleyball and backhand volleyball for junior tennis players aged 8-12 years = 0.924. According to Strand (1993) the reliability coefficient is categorized as very good. Furthermore, Strand (1993) said that if a sports assessment instrument has a reliability above 0.90 then the instrument has a reliable degree of assessment.

The availability of observation sheets used as guidelines in assessing junior tennis players aged 8-12 years in the decision-making process when performing forehand volleyball and backhand volleyball is needed. The observation sheet instrument can be used to assess the ability of perception, decision, execution, feedback, attitudes and behavior of junior tennis players aged 8-12 years while playing tennis, especially in performing basic techniques of forehand and backhand volleyball. If a tennis player has good perception, decision, execution, feedback, and attitude skills, the chances of winning a tennis match are very large, as also reported by Crespo (1998). Every movement in performing forehand and backhand volley shots occurs in a sequence of stages: perception-decision-execution-feedback simultaneously in order to produce good basic techniques in performing basic forehand and backhand volley techniques (Novick, 1988). This shows that every tennis player who is given practice will perform the same actions simultaneously, including; (1) must understand the situation, (2) decide what to do or how to respond to the situation, (3) try as quickly as possible to perform or execute certain hitting techniques, and (4) evaluate the performance or execution he has done and listen to the feedback given by the coach/teacher. Visual perception skills are needed in playing tennis because tennis is a sport that has fast characteristics like a rocket. Decision-making skills needed to achieve tactical and technical goals are very important in playing tennis because the playing environment is very dynamic, in line with research reported by Basiri, et. al (2021). Technical skills and decision-making are two factors that determine performance in the game (Mahedero, et. al., 2015). Thus, each situation becomes a cycle of problems to be solved and tasks to be done by the tennis player in the fastest possible time.

The development of the learning model for basic techniques of forehand volleyball and backhand volleyball based on the integrated training / CPS approach obtained a high inter-rater reliability coefficient (ICC) ($r = 0.901 - 0.931$), this indicates that among the raters in assessing the learning model for basic techniques of forehand and backhand volleyball based on the integrated training approach developed by the researcher has a relatively similar assessment or has the same view of the learning model developed. With the high inter-rater reliability coefficient, the learning model for forehand and backhand volleyball basic techniques training has a

degree of fixity and is relevant if used as a model for teaching basic forehand and backhand volleyball techniques for junior tennis players aged 8-12 years. This is evidenced by the results of the assessment conducted by experts having a level of consistency / consistency of assessment among experts. Strand (1993) said that if a sports skill training model has a reliability coefficient ≥ 0.80 then the model is very good and can be used as a training model to teach a sport skill, including the sport of tennis. This statement is also in line with the opinion expressed by Best et al. (2010) that a training model development is said to meet the requirements of a good model if the model has a meaning of how much the degree of the model developed measures consistently against the object being measured.

According to Horne et al. (2011), in playing tennis, in addition to the provision of mastery of the basic techniques of playing good and correct tennis, it is also very necessary to have a level of consistency / constancy in performing hitting techniques, such as: serving, forehand and backhand groundstroke, smash, forehand volley, and backhand. This is supported by the fact that in playing tennis, 87% of the numbers are obtained due to errors in hitting (unforced errors). Stroke errors are caused by a low level of consistency / persistence of the technique of hitting the ball. Thus a tennis player with a high level of consistency in hitting the ball has a considerable chance of winning the game/match. To get a high level of consistency in playing tennis, it must be formed through a training process by providing the right learning / training model from the start when children learn the basic techniques of playing tennis, especially for junior tennis players aged 8-12 years.

Conclusions

The learning approach model for the basic techniques of forehand and backhand volleyball by integrating Cognitive, Psychology and Skill turns out to facilitate the mastery of the basic techniques of forehand and backhand volleyball for junior tennis players aged 8-12 years. Giving pretest and posttest multiple choice questions to junior tennis players aged 8-12 years was very helpful in the process of deposition of knowledge and understanding of tennis players in performing basic techniques of forehand and backhand volleyball. The observation sheet instrument product that has been developed can be used to assess the decision-making ability, perception, decision, execution, feedback, attitudes and behavior of junior tennis players aged 8-12 years when performing basic techniques of forehand and backhand volleyball. The learning model developed is relevant if used as a model for teaching/training basic forehand and backhand volleyball techniques for junior tennis players aged 8-12 years because it has a level of consistency between raters and has a very good level of validity as a learning model that can be used to train junior tennis players aged 8-12 years.

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