

Model of assessment instrument for basic techniques of serving, forehand and backhand groundstroke, forehand and backhand volley based on “acentos method” for junior tennis players in Yogyakarta region

Modelo de instrumento de evaluación de técnicas básicas de saque, golpe de fondo de derecha y de revés, volea de derecha y de revés basado en el “método de acentos” para tenistas juveniles de la región de Yogyakarta.

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Abstract. To evaluate the basic technical skills of service, forehand groundstroke, backhand groundstroke, forehand and backhand volley, an appropriate and accurate assessment instrument is needed according to the actual tennis game situation. The purpose of this research is to develop an assessment instrument model to the 5 basic techniques based on the acentos method for junior tennis players in the Yogyakarta Region. The design to develop the assessment instrument applies the Research and Development 4D model (Define, Design, Development, and Disseminate). The approach applied was both quantitative and qualitative (mixed method). The research subjects involved 25 junior tennis players of Yogyakarta Province who were under 18 years old in Yogyakarta comprising: 15 male tennis players and 10 female tennis players. Junior tennis players used as research subjects are junior tennis players who actively participate in junior tennis matches in Yogyakarta and the National Tennis Championships. The content validity testing was based on Content Validity Ratio (CVR), while the reliability testing was based on the statistics analysis of Alpha Cronbach Consistency by using SPSS application of genova program package, while the inter-rater reliability coefficient was analyzed using ANOVA. The results showed that the assessment instrument had very good content validity, which was: 0.71-1.00 (> 0.50): 0.71-1.00 (> 0.50), the feasibility level of the assessment instrument is good, and the high inter-rater reliability coefficient = 0.866 - 0.902 ($r = \geq 0.80$). In addition, the factors and indicators of assessment instruments for basic techniques of service, forehand and backhand groundstroke, forehand and backhand volley based on the acentos method were successfully developed, consist of: (1) self-confidence and mental game/psychology, (2) before executing the stroke/stage: perception and decision, (3) the execution of the stroke and the result/stage: execution and feedback, and (4) the attitude and behavior in playing tennis. Thus, it can be concluded that the assessment instrument for basic techniques of service, forehand and backhand groundstroke, forehand and backhand volley based on the acentos method can be used as an assessment instrument for basic techniques for Yogyakarta Region junior tennis players.

Keywords: assessments, basic technique of tennis, acentos method

Resumen. Para evaluar las habilidades técnicas básicas de servicio, golpe de fondo de derecha, golpe de fondo de revés, volea de derecha y de revés, se necesita un instrumento de evaluación apropiado y preciso de acuerdo con la situación real del juego de tenis. El propósito de esta investigación es desarrollar un modelo de instrumento de evaluación de las 5 técnicas básicas basado en el método de acentos para tenistas juveniles de la Región de Yogyakarta. El diseño para desarrollar el instrumento de evaluación aplica el modelo de Investigación y Desarrollo 4D (Definir, Diseñar, Desarrollo y Difundir). El enfoque aplicado fue tanto cuantitativo como cualitativo (método mixto). Los sujetos de la investigación involucraron a 25 tenistas juveniles de la provincia de Yogyakarta que tenían menos de 18 años en Yogyakarta, incluidos: 15 tenistas masculinos y 10 tenistas femeninas. Los tenistas juveniles utilizados como sujetos de investigación son tenistas juveniles que participan activamente en partidos de tenis juveniles en Yogyakarta y en los Campeonatos Nacionales de Tenis. La prueba de validez de contenido se basó en el índice de validez de contenido (CVR), mientras que la prueba de confiabilidad se basó en el análisis estadístico de consistencia Alpha Cronbach mediante la aplicación SPSS del paquete de programas genova, mientras que el coeficiente de confiabilidad entre evaluadores se analizó mediante ANOVA. Los resultados mostraron que el instrumento de evaluación tuvo muy buena validez de contenido, la cual fue: 0.71-1.00 (> 0.50): 0.71-1.00 (> 0.50), el nivel de factibilidad del instrumento de evaluación es bueno y el coeficiente de confiabilidad interevaluadores alto. = 0,866 - 0,902 ($r = \geq 0,80$). Además, se desarrollaron exitosamente los factores e indicadores de instrumentos de evaluación para técnicas básicas de servicio, golpe de fondo de derecha y revés, volea de derecha y revés basados en el método de acentos, que consisten en: (1) autoconfianza y juego mental/psicología, (2) antes de ejecutar el golpe/etapa: percepción y decisión, (3) la ejecución del golpe y el resultado/etapa: ejecución y retroalimentación, y (4) la actitud y comportamiento al jugar tenis. Por lo tanto, se puede concluir que el instrumento de evaluación de técnicas básicas de servicio, golpe de fondo de derecha y de revés, volea de derecha y de revés basado en el método de acentos puede utilizarse como instrumento de evaluación de técnicas básicas para los tenistas juveniles de la región de Yogyakarta.

Palabras clave: evaluaciones, técnica básica del tenis, método acentos

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Introduction

Assessment is an integral part of the training process in tennis. The training process will never have accurate results if there is no periodic assessment. Periodic assessment can be used as a benchmark to determine the results of the training that has been done. Through assessment, athletes will

know their level of ability and understand their weaknesses, which can be improved through appropriate training (Raiola et al., 2018; Yudianta et al., 2022). Assessment instruments in tennis are generally in the form of performance tests. To assess performance appropriately according to the actual situation of playing tennis, a valid and reliable assessment model is needed, one of which is through

assessment. This assessment model is very necessary because valid assessment instruments usually measure what should be measured according to the purpose of making the instrument (Haryanto, J., Edmizal, E., Meyfitri F., Patino, B. B., Haji, J., & Drenowatz, 2023). Assessment instruments that have a high level of validity will certainly be able to validly measure the athlete's ability in accordance with the requirements of the characteristics of the sport (Georgakis, S., Wilson & Evans, 2015; Tomoliyus et al., 2016). Assessment is a performance assessment model that encourages trainees to be able to demonstrate their performance in a real/ and valuable context as the essence of the knowledge and skills they have mastered (Mueller, 2009; J. L. Lund & Kirk, 2010; Raymond et al., 2013). This assessment is an assessment model that is applied in realistic situations and requires trainees to use higher order thinking skills, such as; problem solving, decision making/decision making in using their skills. Thus, decisions are made quickly and accurately according to the demands of the situation at hand (Suzann, 2000; Mueller, 2009; J. Lund, 2013; Sewagegn, A. & Diale, 2020; Fagundes, F. M., Lacambra, C. M., Santandreu, C. S., & Burgues, 2024). In tennis, the assessment model that meets these criteria is the Acentos method-based basic technique assessment model. The Acentos method assessment model is a model of assessing the skill level of trainees on the basis of elements of real situations encountered while playing tennis (Ngatman et al., 2024). The assessment instrument is outlined in the form of a rubric containing factors and indicators of important basic technical elements in tennis (Ngatman, 2020; Ngatman, Alim & Yulianto, 2022). The assessment rubric refers to environmental conditions that are open skills to develop the ability of perception, decision, execution, feedback, and in accordance with the demands of the tennis playing situation (Hidayatullah, 2021 ; Ngatman, et al., 2023).

In tennis, five basic techniques must be mastered by tennis players, including: service, forehand and backhand groundstroke, and forehand and backhand volley. In real playing situations, these five techniques are the most dominant techniques used in playing tennis (Bakhtiar & Ballard, 2015; Utomo et al., 2019; Ngatman, Guntur, Danang, et al., 2023). The research report of Egido et al., (2020), also shows that service, forehand and backhand groundstroke, as well as forehand and backhand volleys are basic techniques that are essential as the basis for developing playing tactics that must be trained from a junior age. From the expert's opinion, it can be concluded that service techniques, forehand and backhand groundstrokes, and forehand and backhand volleys are very important techniques to be mastered by tennis players.

Field tennis is one of the most popular sports in the Yogyakarta Region. Many tennis clubs and schools train junior tennis players aged 18 years and under. The development of junior tennis players is also carried out through regional training camps and regional student training programmes (PLPD). To determine the basic technical skills of playing

tennis periodically, the teacher/coach must conduct an assessment. However, nowadays tennis coaches in Yogyakarta Region, have several problems, including: a) the assessment carried out is still using the assessment of sports skill tests made by foreign experts several decades ago, b) the sports skill test used by the coach is only limited to measuring basic techniques and has not fully measured the tennis player's performance holistically while playing, c) the assessment used cannot measure the tennis player's perception, decision, execution, and feedback abilities according to the actual playing situation. The use of assessment carried out through sports skill tests is a predictor that is considered "invalid", not and holistic in assessing the level of athlete ability according to the actual playing situation, (d) tennis coaches in Yogyakarta Region, do not yet have a standard assessment instrument to assess basic techniques of playing tennis (Veal, 1992; Haywood, 1997; Asencio et al., 2022).

To explore the problem holistically, the author also conducted a needs analysis through questionnaires and interviews with seven people were involved two people are experts in tests, measurements, and sports evaluation and both sports assessment experts have a background of S-3 (postgraduate) education experts in Educational Research and Evaluation Study Programmes and five coaches experts in the province of Yogyakarta and the selection of coaches as experts based adjusted to the number of regions in Yogyakarta Province consisting of 5 districts, where they are licensed international tennis coaches and actively train at tennis clubs/schools. In this section, the research boundaries are explained based on the sample location in Yogyakarta because tennis is developing in this city, then the number of experts involved is selected who are truly ITF certified qualifications and experts who are in accordance with their fields as expert judgment.

The results obtained show that the coaches really need a standardized assessment instrument that can be used to assess basic technical skills ally in accordance with the characteristics of the actual tennis game. With the presence of this standardized assessment instrument, it is expected that it can be used as a guideline to assess the level of basic technical skills possessed by tennis players in a valid, reliable, and objective manner. If the tennis skills assessment instrument fulfils these three requirements, the assessment can be carried out precisely, accurately, steadily, and in accordance with reality (Medina et al., 2013; Morrow Jr et al., 2015; Lutfi et al., 2018; Lacy, 2011; Hambali, B., Hidayat & Rahmat, 2020; Hambali, B., Hidayat, Y., Yudianta, Y., Juliantine, T., Rahmat, A., Gumilar & Nugraha, 2021).

Based on the background of the problem and needs analysis as described before, it motivated the author to conduct research to develop an "Assessment Instrument Model for Basic Techniques of Service, Forehand and Backhand Groundstroke, Forehand and Backhand Volley Based on Acentos Method" for Yogyakarta Junior Tennis Players.

Research method

Research Design

This project begins by clearly defining our objectives (Define), we then design a detailed action plan (Design), proceed to develop the product according to the plan (Development), and finally disseminate the results to the target audience (Disseminate) through various way (Sugiyono, 2019). The first stage is define process that conducted with a preliminary study through observation of the assessment model that has been used by junior tennis coaches in Yogyakarta Region, providing questionnaires and interviews with coaches at schools / tennis associations, inventorying the needs of an effective assessment model that assesses ally and holistically the basic techniques of service, forehand and backhand groundstroke, forehand and backhand volley. The second stage is design process that conducted by identifying important elements of the five basic techniques through Focus Group Discussion (FGD), developing assessment rubrics based on the acentos method according to the skill level of Yogyakarta junior tennis players and having consultation with experts in test preparation, measurement, and evaluation as well as tennis sport experts. The third stage is development process that conducted with the following activities: (1) formulating assessment instruments consisting of basic techniques of service, forehand and backhand groundstroke, forehand and backhand volley based on the acentos method, formulating an assessment rubric containing factors and indicators of the elements of the five basic techniques (2) instrument validation, which involves conducting validation tests by material experts who are competent in their fields. Validation was conducted using the Delphi Technique. (3) Field trials were conducted using questionnaires to obtain suggestions and input from experts, coaches, and junior tennis players in tennis associations/schools after using the assessment instrument developed.

The final stage is disseminate process, after the field test stage is complete and there are no more revisions to the assessment instrument, the final product is a model of assessment instrument for basic techniques of service, forehand and backhand groundstroke, forehand and backhand volley based on acentos method which is feasible and ready to be used to assess basic techniques of playing tennis (Ngatman et al., 2024).

Research Subject

The subjects used to develop "assessment" instruments for basic techniques of service, forehand and backhand groundstroke, forehand and backhand volley based on the acentos method were 25 junior tennis players aged under 18 years consisting of: 15 boys and 10 girls from tennis associations/schools in Yogyakarta Region. The reason for choosing research subjects aged 18 years and under is because this age is a junior category where Indonesian Tennis Association as recognised national tennis championship (TDP Championship) competes in the 18 years and under age group. The subjects of this study were only 25 tennis players because they were the number of tennis players who often participated in tennis matches both at the Yogyakarta

Region and National Levels. Coincidentally, the 25 tennis players are representatives of 5 tennis players from Yogya City, 5 tennis players from Sleman Regency, 5 tennis players from Bantul Regency, 5 tennis players from Kulon Progo Regency, and 5 tennis players from Gunung Kidul Regency.

Data Collection Technique and Instrument

1. Data Collection Technique

This research employed test and measurement techniques. Assessment of basic technical skills of service, forehand and backhand groundstroke, forehand and backhand volley based on the acentos method used ½ competition matches with a "pro set tie break" system.

2. Data Collection Instrument

The research instrument utilized an assessment instrument rubric that contained factors and indicators of the elements of basic techniques of service, forehand groundstroke, backhand groundstroke, forehand volley, and backhand based on the acentos method. Factors and indicators are assessed on the basis of 3 categories, including: important, useful but not important, and useless and not important.

A. Data Analysis Technique

1. Content Validity Analysis

Content validity was measured using the Content Validity Ratio (CVR).

$$CVR = \left[2 \frac{M_p}{M} \right] - 1$$

Description:

$M_p =$

Σ Experts who gave good scores (3 – 4 ratings)

$M =$ Number of experts

1 = The result obtained by the experts

(Kutlu, et. al. 2014)

2. Feasibility Analysis

The feasibility of assessment instruments was conducted through a questionnaire that was completed by trainers in Yogyakarta Region. The data was then converted using 4 categories. The assessment category scale is in Table 1 below.

Table 1. Assessment Criteria

No.	Score Interval	Category
1	$M_i + 1,50 S_{Bi} < X \leq M_i + 3 S_{Bi}$	Very Feasible
2	$M_i < X \leq M_i + 1,50 S_{Bi}$	Feasible
3	$M_i - 1,50 S_{Bi} < X \leq M_i$	Feasible Enough
4	$M_i - 3 S_{Bi} < X \leq M_i - 1,50 S_{Bi}$	Not Feasible

Description:

$X =$ Actual score (achieved score)

$Mean\ Ideal\ Score\ (M_i) = \frac{1}{2} (ideal\ maximum\ score + ideal$

minimum score)

$$\text{Ideal Standard Deviation (ISD)} = \frac{1}{6} (\text{ideal maximum score} - \text{ideal minimum score})$$

3. Reliability Analysis

The reliability test was conducted using the Intraclass Correlation Coefficient /ICC to determine the level of agreement between experts or inter-rater in assessing each factor and indicator on the assessment instrument (Kutlu, M., Yapici & Demirkan, 2014). Reliability was calculated by using the SPSS 23 for windows.

Research result and discussion

Research Result

After passing through the stages of the 4D phasing procedure (Define, Design, Development, and Disseminate), a model of "assessment" instrument was successfully developed as the basic technique of service, forehand and backhand groundstroke, forehand and backhand volley based on the accents method. In the process of preparing the assessment instrument model, a needs analysis is conducted to find out whether the instrument will really be needed.

Based on the needs analysis, an initial draft of the assessment instrument was prepared. The assessment instrument draft contains elements of basic service techniques, forehand and backhand groundstroke, forehand and backhand volley based on the accents method. The draft elements of the assessment instrument were then validated to 7 experts

to get an assessment, suggestions, and input. The results of the assessment of these basic techniques are then analyzed for content validity using the Content Validity Ratio (CVR) formula from Lawshe's, which states:

Description:

CVR = Content Validity Ration

Ne = Number of expert judgement / panelists who give important responds

N = Number of Panelists (Kutlu, et. al. 2014)

$$CVR = \left\{ \left(Ne - \frac{N}{2} \right) / \frac{N}{2} \right\}$$

The results of the assessment from 7 experts were found to provide good value for the draft assessment instrument of basic technique elements. The results of the CVR analysis = 1.00 so that the research can be proceeded to the next stage after revision according to expert suggestions and input.

Furthermore, the researcher developed an assessment rubric that contains factors and indicators of assessment instruments from the 5 basic techniques. This assessment rubric is used as an expert guideline in assessing the basic technique skills of playing tennis. The assessment rubric consists of: (1) observation sheet of assessment of basic techniques, (2) worksheet for playing tennis during 1/2 competition match, (3) instructions and guidelines for completing the observation sheet, and (4) scoring sheet for assessing basic techniques.

Observation sheet of assessment instrument of basic technique

Table 2.
"Insert the name of the table"

Serve	
Factors	Indicators
Confident performance when serving	Have high confidence when going to serve.
	Have the courage and do not hesitate when making decisions (decision making) every time starting to serve. Have mental toughness at important points before starting to serve. The selection of the appropriate serve used according to the game tactics. Have high motivation to maximize the serve to get points.
Before the Serve Execution (Stage: Perception and Decision).	The ability to make the right toss up to suit the position of the receiver. The ability to make an appropriate toss up that will be hit. The ability to make a position before the serve.
	The accuracy of decision making (decision) before the serve is performed based on the receiver's position. The ability to control the ball as a whole before making a serve. The ability to prepare the ready position, balance, backswing, point of contact, and follow thought before making a serve.
While performing the serve and evaluating the result of the serve (stages: execution and feedback).	The accuracy when hitting the serve according to the toss up performed. The serve is effective to increase the opponent's difficulty in returning the ball. The service stroke performed is efficient The decisions made are effective to earn points.
	Find out the percentage of success and failure in making a serve.
Tennis players' attitudes and behaviors during the match.	After making a serve has always returned to the starting position in an unstable equilibrium position. Show a gesture of disappointment if there is a failure (unforce error) when serving. During the game still shows a high consistency of spirit (fighting spirit) in serving. Shows the character of always being fair play / sportsmanship when playing Show a respect attitude towards the opponent if the serve cannot be returned.
	Forehand and Backhand Groundstrok
Factors	Indicators
Self-confidence and Mental Game/Competition (Psychological Aspects) When Striking Forehand/Backhand	Having high confidence when performing forehand/backhand groundstroke.

Groundstroke	Having the courage and determination (decision making) to perform forehand/backhand groundstroke (confident and not hesitant). Having mental toughness during critical points. Applying the right game strategies when performing forehand/backhand groundstroke. Having high motivation to win the game.
Before the Execution of the Stroke (Stage: Perception and Decision).	The ability to anticipate speed, height, spin and distance of the ball from the opponent. The ability to adjust to the direction of the ball. The ability to position before striking the ball. The accuracy of decision making (decision) before performing a forehand / backhand groundstroke. The ability of 5 ball control (reading the trajectory of the ball, anticipating the ball direction, speed, rotation, height, distance, and depth of the ball). The ability to prepare for the ready position, balance, backswing, point of contact, and follow through.
During Execution of Stroke and Evaluation of Stroke (stages: execution and feedback).	The decisions made when striking a forehand/backhand groundstroke are precise, effective, and efficient. The decisions made in performing forehand/backhand groundstroke are effective to cause difficulties for the opponent in returning the ball. The decisions that have been made are effective in scoring points. Recognize the success and failure of each forehand/backhand groundstroke consciously.
The Attitude and Behavior When Performing Forehand/Backhand Groundstroke during the Match.	After striking a forehand/backhand groundstroke always return to the basic position before hitting. During the game still shows a high consistence of spirit (fighting spirit). Show a gesture of disappointment if there is an unforced error during forehand/backhand groundstroke. Shows a fair play/sporting character when playing. Showing respect towards opponents.
Forehand and Backhand Volley	
Factors	Indicators
Self-Confidence and Mental Performance (Psychological Aspects) When Performing Forehand/Backhand Volley	Having high confidence when performing forehand/backhand volleys. Having the courage and determination (decision making) to perform forehand/backhand volley every time (confident and not hesitant). Having mental stability during critical points when performing forehand/backhand volley. Applying the right game strategies when performing forehand/backhand volley. Having high motivation to win the match.
Before the execution of the forehand/backhand volley stroke (stages: Perception and Decision).	The ability to analyze the game situation. The ability to adjust to the arrival of the ball. The ability to be in position before performing forehand/backhand volley Decision-making accuracy before performing forehand/backhand volley The ability of 5 ball control (reading the trajectory of the ball, anticipating the ball's direction, speed, rotation, height, distance, and depth). Ability to maintain ready position, balance, backswing, point of contact, and follow through when hitting forehand/backhand volleys.
During the execution and evaluation of forehand/backhand volley strokes (stages: execution and feedback).	The decisions made while performing forehand/backhand volleys are appropriate, effective, and efficient. The decisions made while performing forehand/backhand volleys are effective to give the opponent difficulty in returning the ball. The decisions that have been made are effective in scoring points. Recognize the successes and failures of each forehand/backhand volley made consciously.
The Attitude and Behavior When Playing Forehand/Backhand Volley	After striking a forehand/backhand volley always return to the starting position (basic position) before striking the next volley. While in the game keep showing a high consistency of spirit (fighting spirit). Showing a gesture of disappointment if there is an unforced error when performing forehand / backhand volley. Showing the character of being fair play / sportsmanship when playing. Showing respect towards opponents.

Worksheet

The assignment was given to the tennis players that were used as research samples. Thus, the tennis players understand the tasks that must be performed while on the court. Furthermore, the 25 junior tennis players played 1/2 competition. The system used is a tie break pro set by looking for a score of 10. When the junior tennis player plays 1/2 competition, it is assessed by an expert using an observation sheet. This observation sheet is used as a guideline to assess the skill level of basic techniques of serving, forehand and backhand groundstroke, forehand and backhand volley based on the accents method when playing tennis.

Instructions and guidelines for completing the observation sheet

Instructions and guidelines for completing the observation sheet are used by tennis coaches in marking or scoring the factors and indicators of the basic techniques of serving, forehand and backhand groundstroke, forehand and backhand volley based on the accents method that tennis players

display when playing/competing.

Table 3.

“Insert the name of the table”

Marks or scores	Description
“+” (plus) and score 3	If during play the five basic techniques always appear, between 90 - 100%.
“v” (tick) and score 2	If during play the five basic techniques appear quite a lot, between 66% - 89%.
“-” (minus) and score 1	If during play the five basic techniques appear a little, between 0 - 65%.

Scoring sheet of assessment instrument

The scoring sheet is used by tennis coaches to assess the skill level of the five basic techniques of each tennis player when competing 1/2 competition. The assessment is based on 4 factors in the assessment rubric. The skill level of basic techniques based on the method is then classified into 3 categories, which are: good, medium, and less. The formula is as follows.

total score of all panelists/experts

(Ngatman et. al., 2023)

4

Description:

Total panelist who scored = 5 tennis coaches and 2 expert tests, measurement and sports evaluations

4 = number factors in rubric

Content validity result

Expert validation of the assessment rubric based on 3 categories which consist of: important, useful but not important, and not important from the assessment instrument can be seen in Table 2.

Table 4. Content Validity Assessment Results

Judges	Assessment Factors			
	Self-Confidence & Mental Game (Psychology) (1)	Before Performing a Stroke (Stage: Perception and Decision) (2)	When Performing Strokes and Evaluating Strokes (Stage: (Execution and Feedback) (3)	Attitude and Behavior When Playing Tennis (4)
AAL	Important	Important	Important	Important
HYL	Important	Important	Important	Important
IGN	useful but not important	Important	Important	Important
GTR	Important	Important	Important	Important
WDY	Important	Important	Important	Important
RNF	Important	Important	Important	useful but not important
WSN	Important	Important	Important	Important

From Table 2 above, the factors of confidence and mental game/psychology; 6 raters stated important and 1 rater stated useful but not important. Factors before performing a stroke/stage: perception and decision; all raters stated that it was important. Factors during the stroke and evaluation of the stroke/stage: execution and feedback, all 7 raters stated that it was important. Attitude and behavior factors; 6 raters stated important, while 1 rater stated useful but not important.

The data can be analyzed with CVR. The results of the CVR calculation are presented in Table 3.

Table 5. CVR calculation results

Factors of Assessment Instruments	Coefficient of Content Validity (CVR)
Self-Confidence & Mental Game (Psychology)	0.71
Before Performing a Stroke (Stage: Perception and Decision)	1.00
When Performing Strokes and Evaluating Strokes (Stage: (Execution and Feedback)	1.00
Attitude and Behavior When Playing Tennis	0.71

All factors of assessment instruments to the 5 basic techniques have content validity > 0.50. Thus, the assessment instrument factors can be used as an instrument for basic techniques of serving, forehand and backhand groundstroke, forehand and backhand volley for DIY (Yogyakarta Special Region) junior tennis players.

1. Feasibility analysis

A questionnaire of 15 questions/statements was given to 5 coaches in Yogyakarta. Furthermore, the five trainers provided an assessment of the assessment instrument developed with feasible results.

2. Instrument reliability test

The results of the reliability test of the assessment instrument for the confidence factor and mental play with the Cronbach alpha consistency analysis technique = 0.882, ANOVA / inter-tester reliability correlation = 0.878. Factors before the stroke/stage: perception and decision reliability coefficient = 0.894, inter-tester reliability coefficient = 0.902. Factors when performing strokes and evaluating strokes/stages: execution and feedback reliability coefficient = 0.873, inter-tester reliability coefficient = 0.866. Attitude and behavior factors in playing tennis reliability coefficient = 0.871, inter-tester reliability coefficient = 0.896. These results indicate that all four factors have high reliability coefficients as assessment instruments for basic serving techniques, forehand and backhand groundstrokes, forehand and backhand volleys based on the acentos method. The magnitude of the reliability coefficient of the assessment instrument factors is presented in Table 4.

Table 6. Reliability Coefficient of Factors

Factors	Consistency Alpha Cronbach	ANOVA	Status
Self-Confidence & Mental Game (Psychology)	0.882	0.878	Reliable
Before Performing a Stroke (Stage: Perception and Decision)	0.894	0.902	Reliable
When Performing Strokes and Evaluating Strokes (Stage: (Execution and Feedback)	0.873	0.866	Reliable
Attitude and Behavior When Playing Tennis	0.871	0.896	Reliable

Thus, these 4 factors are fundamental factors and are very important to be used as assessment instruments for basic techniques of serving, forehand and backhand groundstroke, forehand and backhand volley based on the

acentos method for DIY junior tennis players.

Discussion

The validity and reliability of assessment instruments are two primary requirements that must be considered in the data collection process for teaching/training purposes in all sports. With valid and reliable data, conclusions can be drawn accurately. This is aligned with the opinion from Best, K. J., Kahn et al., (2010), who stated that "validity and reliability are essential to the effectiveness of any data gathering procedure". To improve the quality of data collection, the instruments used must meet the requirements with good validity and reliability. When measuring and assessing the psychomotor domain, especially sports skill tests, validity and reliability requirements are absolutely indispensable. Likewise, when developing a performance-based assessment instrument (assessment), the validity and reliability requirements of the assessment instrument are absolutely necessary (Portney & Watkins, 2009; Villouta et al., 2022; Susiono et al., 2024).

One of the validities of assessment instruments in sports skill tests that must be considered is the extent to which the level of accuracy of the assessment instrument meets the requirements of its substance (content). Content validity is one of the requirements that should not be abandoned in developing assessment instruments (Llerena et al., 2020; Yaakop et al., 2023). Similar opinions were also conveyed by Nieto et al., (2022) and Fresneda, A. G., et.al, (2023) that content validity is very important in compiling assessment instruments both for knowledge tests, skills and psychometric tests. Based on the results of the content validity analysis of the factors and indicators of the basic techniques of serving, forehand and backhand groundstroke, forehand and backhand volley based on the acentos method, several tennis experts stated that it was good from its content validity. Thus, it is feasible to use as an assessment instrument for the five basic techniques. The results of the content validity test of the four factors have very good validity coefficients so that they have a degree of accuracy as an assessment instrument. This is shown by the Content Validity Ratio (CVR) coefficient value of all factors and indicators > 0.50. The level of accuracy (validity) of an assessment instrument if the content validity ratio coefficient obtained is > 0.50 then the assessment instrument has a good level of validity. In other words, the instrument has a degree of measurement accuracy and is able to measure the items that should be measured (Nitko & Brookhart, 2007; Mohajan, 2017; Rismayanthi et al., 2020). The same opinion is also said by Borg & Gall, (2003) and Taherdoost, (2016), who said that if the assessment instrument has a good content validity coefficient then the instrument has represented what is planned to be measured. Furthermore, Borg & Gall, (2003) and Lutfi et al., (2018), argue that if the items of the instrument have covered all aspects of the construct or variable to be measured, then the instrument in terms of con-

tent can be declared valid. From this opinion, it can be inferred that the four factors of the assessment instrument for the basic techniques of serving, forehand and backhand, forehand and backhand volleys based on the acentos method developed can be used as an assessment instrument for Yogyakarta Region junior tennis players.

The assessment instrument for basic serving techniques, forehand and backhand groundstroke, forehand and backhand volleys based on the acentos method after analysis obtained a high reliability coefficient both through Genova Program analysis (Consistency Alpha Cronbach $r = 0.871 - 0.894$) and Inter-Tester Reliability (Anova $r = 0.866 - 0.902$). This indicates that: (1) the assessment instrument developed has a degree of consistency/assessment among raters in assessing the same subject, (2) the seven raters have the same agreement and perspective that the four factors of the five basic techniques are fundamental and indispensable items for assessing basic techniques, (3) the assessment instrument is accepted and proper to use as an assessment instrument to assess basic technique skills to play tennis. If an assessment instrument has a high reliability coefficient, it can be used as a standardised test and is suitable for assessing skills (Villouta et al., 2022). Strand, Bradford N., Wilson, (1993), said that if the assessment instrument used to assess sports/physical activity skills has an intrarater and interrater reliability coefficient ≥ 0.80 , it can be said that the instrument is good to use as an assessment instrument to measure sports skills (Currell, K. & Jeukendrup, 2008; Rismayanthi et al., 2020). This is aligned with the opinion that a test is considered to meet the requirements of a good assessment test/instrument if the test shows "how much the degree of the measuring instrument is consistently measuring the target being measured". In other words, the assessment instrument model for the basic techniques of serving, forehand and backhand groundstroke, forehand and backhand volley based on the acentos method developed has a good level of assessment reliability (Sukadji, 2000; Martin et al., 2013; Medina et al., 2013; Kutlu, M., Yapici & Demirkan, 2014).

Whether playing singles or doubles, service is a technique that tennis players must master. This is because the service is the first attack used by the player to pressure the opponent in an effort to get numbers (Sawali & H., 2020). The control of the service is entirely in the hands of the tennis player; therefore, the service stroke must be maximized in order to get numbers and win the match. The success of the service technique is greatly influenced by the tennis player's ability to perform a simple action, a continuous action, a good stable balance and placement of the ball, and the most correct grip (Damiant, P. & Cristian, 2021).

Forehand and backhand groundstroke are the most dominant techniques used (Larson, Emma J., Guggenheimer, 2013; Budi, D. R. Syafei M., 2020; Nugroho, et. al., 2023; Ngatman, et al., 2023). The ability of tennis players to read the trajectory, direction and anticipation of the incoming ball/perception, make decisions before hitting/decision, hitting/execution, and feedback on

the shots made are elements that affect the success of forehand and backhand groundstroke techniques, forehand and backhand volleys (Novick, 1988; Crespo, et.al, 1998; Unierzyski, Piotr & Crespo, 2007; Ngatman, Guntur, Gani, et al., 2023).

Mastery of forehand and backhand volleys is as important as serving techniques and forehand and backhand groundstrokes in playing tennis. This is because the volley technique can be used as one of the weapons to suppress the opponent to get numbers in playing singles and doubles (Ngatman, et. al. 2022). Especially when playing doubles, volley shots are even more important than service shots as well as forehand and backhand groundstrokes because the majority of numbers are obtained from these shots. The forehand and backhand volley is a shot that if trained intensively can be used as a weapon to kill the opponent in a tennis game because it has a greater ball speed when compared to other tennis shot techniques (Hsiao, et.al., 2008; Hung Tu, J., et.al., 2010; Lin Tai et al., 2022). According to Cow, J. W., Knudson, D. V. & Andrew, D., P., (2007), stated that forehand and backhand volleys can be used as an approach to play to narrow the opponent's playing area/zone of play after the tennis player performs an approach shot to pressure the opponent. In a game of tennis, serve, forehand and backhand groundstrokes, and forehand and backhand volleys are very important basic techniques that must be mastered in playing tennis. These five techniques are hitting techniques that are always used when playing tennis (Utomo, 2019). However, in playing tennis, to win a match is not necessarily only determined by the skill of mastering the techniques of serving, forehand and backhand groundstroke, forehand and backhand volley alone. There are other factors that have a significant role beyond the mastery of the five basic techniques. According to Novick, (1988) and Mahedero et al., (2015) and Bakhtiar & Ballard, (2015), factors that influence the success of serving, forehand and backhand groundstroke, forehand and backhand volley in playing tennis, including: mental competition, the ability to analyze the situation and read the direction of the ball (perception), decision making before striking, the accuracy of execution in striking (execution), feedback on the results of the stroke, and attitude and behavior in the match.

Furthermore, Novick, (1988) and Pankhurst, (2013) and Unierzyski, Piotr & Crespo, (2007), said that these elements take place simultaneously and quickly when playing tennis so that a fast motion response is also needed. A similar opinion was also conveyed by Cayer, (1988) and Ngatman, et.al., (2023), who said that in playing tennis the actions performed by tennis players imply continuous reactions and decision making in diverse situations. Reactions are carried out starting from the situation analysis stage, anticipation and adjustment of the direction of the ball's arrival, before decision making, technique decision making, and stroke evaluation stages. Therefore, the training provided is expected to make players automate decision making and adjust it to the appropriate technique. On the basis

of this expert opinion, in preparing the assessment instrument, these components must be part of the assessment.

The results of learning tennis playing skills carried out by Yogyakarta junior tennis players can only be done through the ½ competition match system. From this ½ competition match, it will be carefully observed how confidence and mental attitude in playing tennis, before decision making, the accuracy of making decisions when striking, and the attitudes and behaviour of tennis players in implementing these four factors (Bakhtiar & Ballard, 2015; Ngatman, 2020; Ngatman et. al., 2022). Of course, these four factors are very important things when performing basic techniques of serving, forehand and backhand groundstroke, forehand and backhand volley in playing tennis. Through this ½ competition match, tennis players will feel the situation of playing real tennis where this situation will always be encountered when they play (the real game of tennis).

In order to be able to observe carefully the four factors, an observation sheet instrument, assignment sheet, and an assessment sheet are needed to observe the performance displayed by the tennis player through the assessment instrument of the five basic techniques based on the acentos method. The instruments chosen to conduct these observations and assessments are generally in the form of observation sheets, task sheets, and assessment rubrics. The availability of observation sheets, task sheets, and rubrics is very important because it is an essential guideline for assessing the athlete's performance while playing. The contents contained in these assessment instruments consist of confidence, attitude, and skills (perception, decision, execution, and feedback) that athletes have when playing/competing (Salom, et. al. 2019; Fresneda et. al., 2023). Thus, the assessment carried out becomes more comprehensive and in accordance with the actual playing situation.

Conclusion

From several expert opinions, it can be concluded that service, forehand and backhand groundstroke, and forehand and backhand volley are basic techniques that are very important and must be mastered in playing tennis. The five techniques are hitting techniques that are always used when playing tennis.

The need of assessment instrument for basic techniques of service, forehand and backhand groundstroke, forehand volleyball and backhand volley based on acentos method is needed for Yogyakarta junior tennis coaches. The assessment instrument model was found to be a convenient method for tennis coaches in assessing the level of tennis playing skills ally/realistically. The assessment instrument of the five basic techniques based on the acentos method has excellent content validity and a high inter-rater reliability coefficient so that it can be used as a tennis playing skills assessment instrument for Yogyakarta junior tennis players. The four important factors of assessment instruments con-

sist of: confidence and mental game/psychology, before executing the stroke/stage: perception and decision, the execution of the stroke and the result/stage: execution and feedback, as well as attitude and behavior. These four factors are very important factors used as assessment instruments when playing tennis for Yogyakarta junior tennis players. This is because these factors are a description of the actual tennis game situation and will always be encountered when playing tennis.

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