



Innovative Android-Based Talent Identification Model for Young Indonesian Basketball Players: Integrating Anthropometrics, Biomotor, Technical, and Tactical Skills

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Qualitative Study

Abstract

This study aims to evaluate the potential and talent of young basketball players at an early age in a confident and diplomatic manner, aiding coaches in identifying athletes using an Android-based platform. The research utilized a research and development methodology, specifically following the Borg and Gall development model. This approach was selected to create an Android-based method for assessing basketball talent. The study produced the following key findings: 1) the BBTT application was designed and developed as an effective tool for evaluating the talents of young basketball athletes, 2) the application significantly enhances the efficiency of assessing young basketball players by providing fast, precise, and accurate evaluations, and 3) it has a positive impact on the development and evaluation processes, particularly in uncovering the potential of young athletes. The results demonstrate that the BBTT application is a valuable tool for talent assessment, as validated by experts. It significantly improves the speed, accuracy, and precision of assessments and simplifies the process of identifying and nurturing young athletes' potential. Consequently, the BBTT application has the potential to streamline the coaching process and foster the development of talented young basketball players.

Keywords: Android; Assessment; Basketball; Development; Athlete

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Introduction

The competence of young athletes typically stems from structured and guided coaching (Susanto et al., 2023). Selecting talented athletes is crucial for achieving peak performance (Susanto et al., 2024). In Indonesia, a talent identification assessment model for young basketball players plays a vital role in developing potential athletes at the national level. This model ensures that the player evaluation process is more targeted and measurable, guaranteeing that the identified talent has the potential to progress to higher levels. Athletes must possess strong technical, physical, and skill abilities (Bahtra et al., 2023; Januario & Warthadi, 2024). Therefore, maintaining excellent physical condition is essential for optimal performance (Zanada, 2023; Subekti et al., Jariono et al., 2024). The timing of physical maturation also significantly impacts player performance, as early-maturing players often have physical advantages that can influence selection processes (Arede et al., 2021). This finding suggests that the assessment model should consider maturation timing to prevent biases that favor physically advanced players over those who may mature later.

In the highly competitive world of sports, particularly in basketball, talent identification and development are crucial for building a strong and successful team. Manual assessment of basketball games is often time-consuming and inefficient, especially when managing a large number of athletes (Chomatek & Sierakowska, 2021). This manual process tends to be time-consuming as data must be collected, recorded and analyzed manually by the coach or evaluator, which can introduce human error and delays in decision-making. Manual methods of assessment, which rely heavily on manual data collection and analysis, present several challenges, including human error, time consumption, and limited analytical depth (Xu et al., 2020). Manual assessment processes in sports often involve subjective evaluations by coaches, which can lead to inconsistencies and biases (Leyhr et al., 2021).

The manual scoring of basketball games is time-consuming and inefficient, highlighting the need for a faster, more precise, and effective scoring method. This can be addressed through an Android-based assessment system, which enables digital, real-time evaluations. Integrating Android-based assessment into basketball scoring offers a transformative approach to improving the efficiency and accuracy of player evaluations. By leveraging Android technology, real-time data collection and automated analysis streamline the scoring process, providing coaches with immediate insights into player performance (Simmons, 2019). This shift not only accelerates decision-making but also ensures a more objective evaluation of athletes, as it minimizes biases inherent in manual scoring methods.

The application also enables more structured data storage and management, simplifying the tracking of player development over time (Hidayah et al., 2024). Additionally, the app's features are tailored to the local Indonesian context, ensuring they are relevant and effective in various training environments. This application aims to make the talent identification process more consistent and accurate, helping to discover and nurture the best basketball talents in Indonesia. The development of an Android-based application for talent identification in young basketball players in Indonesia addresses a critical need in the sports industry. By integrating various assessment aspects-such as anthropometry, biomotor skills, technical abilities, and tactical skills-into a single platform, the application streamlines the evaluation process for coaches and talent scouts (Meisel et al., 2022). This approach aligns with recommendations from studies that emphasize the importance of delaying

specialization in basketball until a certain age to prevent injuries and optimize player development (Post et al., 2021). The app's real-time assessment capability and structured data storage resonate with research highlighting the significance of reliable and efficient data collection methods in youth sports (Befus et al., 2021).

Studies have shown that tailoring training programs and assessment tools to specific cultural contexts can enhance player engagement and performance outcomes (Jing, 2023). Additionally, the focus on maturational, morphological, and fitness attributes in talent prediction aligns with research emphasizing the importance of physical characteristics in identifying and nurturing young basketball talents (S. Ramos et al., 2021). The emphasis on physical fitness development and the reliability of tests for speed and agility assessment in youth basketball players underscores the significance of comprehensive player evaluation methods (Soares et al., 2023). Research has shown that talent selection strategies play a crucial role in the success of national team programs, emphasizing the need for effective identification and development of young talents (Kalén et al., 2021). The innovation in this research lies in the application's potential to enhance and refine talent identification processes, aligning with the objective of optimizing player selection strategies in basketball programs. By offering a platform for structured assessment and data analysis, the app can assist in identifying promising players and tracking their development over time, thereby contributing to the overall enhancement of basketball talent.

This research is critical due to the urgent need to enhance efficiency and accuracy in the talent identification process for young basketball players in Indonesia. The manual assessment methods currently in use have proven to be time-consuming, ineffective, and prone to errors, especially when managing large numbers of athletes. In this context, the development of an Android-based assessment model becomes essential. This model not only addresses the shortcomings of the manual process but also introduces advanced technology into sports, enabling more accurate identification and development of players' potential. Furthermore, this research plays a crucial role in ensuring that the talent selection process is objective and systematic, ultimately contributing to the overall quality of basketball players.

This research aims to evaluate the potential and talent of young basketball players at an early age in a confident and systematic manner, assisting coaches in identifying athletes using an Android-based platform. Additionally, this study serves as a foundation for expanding knowledge on the procedures and implementation of basketball talent scouting tests. The findings of this research offer valuable benchmarks for identifying basketball talent in players aged 10-14 years through an Android-based system. Moreover, it provides significant advantages for coaches, enabling them to assess young players' basketball skills more quickly, easily, and accurately. This research is focused on developing an assessment model for Android-based talent identification in youth basketball players, emphasizing anthropometry, biomotor skills, techniques, and tactics.

Literature Review

Model For Talent Identification of Young Indonesian Basketball Players: The talent identification model for young basketball players in Indonesia, based on the Android-Based Assessment Model for Talent, offers a novel approach to evaluating athlete potential. This model utilizes Android technology to conduct a series of structured assessments, making the evaluation process more systematic and widely accessible (Quílez-Maimon et al., 2023). This model utilizes Android technology to conduct structured assessments covering a broad spectrum of skills essential for basketball performance, including technical abilities, physical conditioning, tactical

understanding, and mental resilience.

The integration of real-time data collection via an Android application enables a thorough analysis of various performance metrics. For example, research indicates that agility and change of direction (COD) are crucial for basketball performance, and specific tests to measure these attributes are vital for identifying talent in young players (Baena-Raya et al., 2024). Utilizing these tests can assist coaches and talent scouts in making well-informed decisions about player development pathways. Additionally, the model's use of algorithms for data analysis improves its capacity to deliver accurate assessments of player potential. Research highlights that physical fitness, technical skills, and psychological attributes are all crucial predictors of success in basketball (S. Ramos et al., 2019). For instance, psychological factors like intrinsic motivation and emotional stability have been recognized as key predictors of sports talent, indicating that a comprehensive approach to assessment is essential (Ribeiro Junior et al., 2019a). Aligns with the findings from various studies that emphasize the need to consider both physical and psychological dimensions in talent identification processes (Pino-Ortega et al., 2021a).

A systematic review of training design and performance analysis in basketball emphasizes the significance of specific physical tests, such as sprint and agility assessments, within the talent identification framework (Pino-Ortega et al., 2021b). These tests not only assess physical capabilities but also offer insights into players' potential for growth and development in the sport. Additionally, the model's structured approach guarantees consistent evaluations of young athletes, which is essential for their long-term talent development in basketball (EPURE & BĂDĂU, 2021). By incorporating a comprehensive set of assessments that evaluate both physical and technical aspects, this model aids coaches in making informed decisions that enhance the effective development of young athletes. The focus on systematic data collection and analysis makes this model a valuable tool in the evolving field of sports talent identification.

The Role of Android-Based Technology in Identification of Young Indonesian Basketball Players: The role of Android-based technology in the talent identification model for young basketball players in Indonesia is pivotal. Integrating Android technology into this model significantly improves the efficiency, accuracy, and structure of the assessment process (Mulya et al., 2021). By utilizing Android applications, coaches and evaluation teams can collect real-time data on various aspects of players' performance, including technical, physical, and tactical skills (Loia & Orciuoli, 2019). This capability is crucial for systematically and early identifying potential talent, a key factor in developing elite athletes. Research shows that the advancement of Android-based applications has greatly influenced the sports field by improving data management and analysis (Ardha et al., 2024a). These applications facilitate the collection of detailed performance metrics, which can be analyzed using specialized algorithms designed to evaluate a player's potential based on specific criteria. Such technological advancements provide a deeper understanding of an athlete's capabilities, which is essential for effective talent identification (Ardha et al., 2024b).

Additionally, the systematic collection and analysis of data through these applications not only streamline the identification process but also aid in the continuous development of players. This longitudinal tracking is crucial for identifying progress and customizing training programs to optimize each athlete's potential (Parra-Martinez & Wai, 2023). The ability to analyze data in real-time allows coaches to make informed decisions quickly, adapting training regimens to better suit

the evolving needs of their players (Khan et al., 2022). By employing such methodologies, coaches can better understand the multifactorial nature of talent development, which encompasses various physical and psychological attributes (O. A. S. Rapidah, 2018).

Moreover, using mobile technology in sports talent identification aligns with global trends that emphasize the importance of early detection and systematic development of young athletes (Till & Baker, 2020a). This approach not only helps identify promising players but also creates a supportive environment for their growth, contributing to the success of sports programs in Indonesia. In conclusion, Android-based technology plays a crucial role in the talent identification model for young basketball players in Indonesia. It improves the efficiency and accuracy of data collection and analysis, supports the ongoing development of athletes, and adheres to contemporary practices in sports talent identification (Torres-Ronda et al., 2022). By leveraging these technological advancements, coaches can more effectively identify and nurture top potential athletes.

Methods

Research Design: This study employed a research and development approach based on the Borg and Gall development model. This method was selected to create an Android-based basketball talent assessment tool. The study aims to design and develop a suitable Android-based assessment system and produce a basketball evaluation application specifically for young children. The goal is to guide talent identification for children aged 10-14 years. Figure 1 illustrates the steps involved in this study.

In the initial stage, the researcher focused on individuals aged 10-14 years, who were the target group for the study. The detailed development method employed is outlined in table 1.

As shown in table 1, the development of an Android-based basketball assessment using the Borg and Gall development model involves a series of structured and systematic stages. The process began with thorough information gathering to understand existing needs and challenges. This was followed by planning to set objectives and design the application. An initial prototype was created and tested on a limited basis to gather initial feedback, which led to revisions and larger-scale field testing. The application was then refined through multiple testing stages until it reached a final version ready for operational use. This comprehensive process aims to produce an effective, efficient, and reliable assessment tool to help coaches and evaluation teams identify young basketball players' talents objectively and thoroughly.

Data Collection Technique: In this study, the Android application was tested on basketball athletes aged 10-14 years as part of the research and development process.

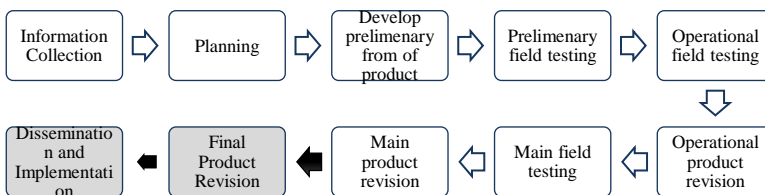


Figure 1. The Borg and Gall development model was modified by researchers

Table 1. Steps and descriptions Bord and Gall development model

No.	Steps	Description
1	Information Collection	This stage involved collecting detailed information on the needs and challenges associated with basketball talent assessment. Data was gathered from coaches, players, and technologists to identify the limitations of manual methods and explore the potential benefits of using Android technology in the assessment process
2	Planning	Based on the collected information, the planning stage involves setting objectives, devising strategies, and creating the initial design for the Android-based application. This plan includes identifying key features that the application must have, such as data collection, player performance analysis, and results reporting
3	Develop Preliminary Form of Product	At this stage, an initial prototype of the Android app is developed, incorporating the basic planned features such as the user interface and an initial assessment module. This prototype is used to test the fundamental functionality of the app
4	Preliminary Field Testing	The developed prototype is subsequently tested in a limited field setting, such as with a small group of players and coaches. The goal of this testing is to identify any bugs or deficiencies in the application and to gather initial feedback from users
5	Operational Product Revision	Based on the results from the initial field testing, the application was revised to address the identified shortcomings. These revisions included improvements to the user interface, enhancements to features, and refinements to the scoring algorithm
6	Main Field Testing	After the revisions, the app was tested once more in a broader environment, involving a larger number of players and coaches. This testing aimed to assess the app's performance in real-world scenarios and ensure its effectiveness on a larger scale
7	Operational Field Testing	In this stage, the application undergoes intensive testing under field conditions that closely resemble actual operational use. These tests are designed to ensure that the application operates reliably and effectively across various conditions that may be encountered during assessments
8	Main Product Revision	After completing a series of field tests, the app was revised and refined based on the final feedback from users. These revisions ensure that the app is fully prepared for widespread use by coaches and evaluation teams in the talent identification process for young basketball players

The small-scale trial involved ten basketball students from the junior high school UNP laboratory development , while the large-scale trial included 100 athletes from the Padang Warriors Basketball Academy. The results of the Android-based basketball assessment were evaluated by the coach for these groups. The details of the trial are summarized in table 2.

According to table 2, the study sample consisted of 100 talented basketball athletes aged 10-14 years from the Padang Warriors Basketball Academy.

Research Instrument: Data collection techniques in this study used questionnaires and observation checklist. The required questionnaire includes:

1. The Android assessment instrument comprises three dimensions: anthropometrics, biomotor skills, and technical and tactical skills. Each dimension includes the following components:

Table 2. Type validators

Type of validators	Position	School/Community Basketball
Media Expert A	Head of Department	School A
Media Expert B	Senior Sport Teacher	School B
Material Expert A	Non-formal Education	Community A
Material Expert B	Teacher of Basketball	School B
Instructional Model	Senior Coach of Basketball	Community B

- a. Anthropometrics: Height, body weight, and arm span.
 - b. Biomotor Skills: Sit-ups, push-ups, back-ups, wall sits, and a 30-meter sprint.
 - c. Technical and Tactical Skills: Crossover dribble, reverse dribble, chest pass, bounce pass, and free throw.
2. The expert evaluation instrument includes: 1) media experts, 2) material experts, and 3) instructional model experts.

Data analysis Techniques: This study employed descriptive percentage analysis to assess expert evaluations and judgments. The effectiveness of the Android Basketball Talent Assessment was tested through: 1) instrument validity tests, 2) instrument reliability assessments, and 3) descriptive result analysis. Additionally, the data collected were analyzed using Statistical Package for the Social Sciences (SPSS) software.

Results

Android Assessment Basketball Design: The Basketball Talent Tracker (BBTT) is a comprehensive application that integrates material guidance, athlete assessment, and evaluation into a single platform. The material guides within BBTT offer essential information and training to help athletes develop both basic and advanced basketball skills (Figure 2). Athlete assessments are conducted digitally, enabling coaches to monitor individual performance in real time across various game aspects. Additionally, the evaluation feature in BBTT provides detailed analysis of each athlete's development, offering tailored feedback and specific improvement plans.

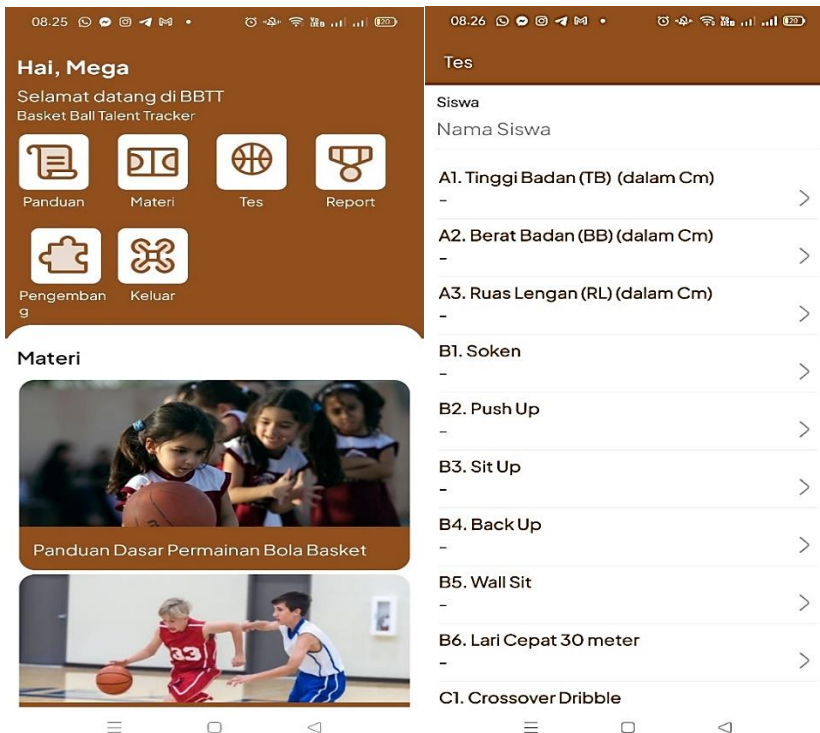


Figure 2. Basketball Talent Tracker (BBTT) design

As a result, BBTT is a crucial tool for coaches and evaluation teams to effectively and efficiently identify and nurture the potential of basketball players.

Validity Test: In the validity test, testing is carried out which aims to determine the level of validity of the BBTT application.

Based on table 3, the conclusion drawn from the assessment of all design items for the BBTT application is that the average rating is 90%. This indicates that the BBTT application is deemed suitable for assessing basketball talent.

The conclusion from the material assessment of the BBTT application is an average rating of 92.75%. This indicates that the BBTT application is well-suited for evaluating basketball talent. The conclusion from the material assessment of the BBTT application is an average rating of 92.33%. This suggests that the BBTT application is appropriate for evaluating basketball talent (Table 3).

Reliability: Reliability testing is crucial for ensuring that the assessment results produced by the app are consistent and dependable. By conducting a reliability test, we can evaluate how stable and reliable the assessment instrument is under different conditions and with various users. This test aims to determine the level of reliability of the BBTT application.

Based on table 4, the result has reliability value between 7.20-8.90. It can be concluded good and acceptable.

Result of Descriptive Statistic: Descriptive statistical testing was performed on each test item to calculate the mean and standard deviation, which are used to categorize the items. The table 5 displays the results of these descriptive statistics. These results serve as an indicator of the suitability of the BBTT application for use.

Discussion

Design and Development of Basketball Talent Tracker (BBTT) Application

This study demonstrates the effectiveness of the BBTT application in enhancing basketball skills among young talents. The design of the BBTT, which received a high rating of 90% from media expert validation, indicates that the effective design significantly improves the assessment of basketball skills. The BBTT application is a comprehensive tool for developing basketball players, featuring three main components: materials, assessment, and evaluation.

Table 3. Media, Material and Design instructional expert validation result

No.	Dimensions	%	Tiers
Media expert validation result			
1	Display Design	85	Very suitable
2	Feature Completeness	89	Very suitable
3	Quality of Learning Materials	89	Very suitable
4	Ease of Useability	97	Very suitable
	Overall Media Expert	90.00	Very suitable
Material expert validation result			
1	Basic guidelines for playing basketball	93	Very suitable
2	Guidelines for playing basketball	91	Very suitable
3	Procedures for playing basketball	90	Very suitable
4	Game flow and evaluation	97	Very suitable
	Overall Media Expert	92.75	Very suitable
Design instructional expert validation result			
1	Anthropometrics	90	Very suitable
2	Biomotor	92	Very suitable
3	Tactical skills	95	Very suitable
	Overall Media Expert	92.33	Very suitable

Table 4. Validity and Reliability Result

No.	Indicator	Validities	Cronbach's alpha coefficient value	Description
1	Height	0.348-0.545	0.810	Good
2	Body Weight	0.800-0.810	0.720	Acceptable
3	Arm Span	0.387-0.662	0.890	Good
4	Soken	0.453-0.890	0.812	Good
5	Push up	0.810-0.812	0.790	Acceptable
6	Sit up	0.670-0.680	0.880	Good
7	Back up,	0.450-0.780	0.760	Acceptable
8	Wall sit	0.463-0.890	0.767	Acceptable
9	Sprint	0.348-0.544	0.815	Good
10	Crossover dribble	0.800-0.800	0.727	Acceptable
11	Reverse dribble	0.389-0.668	0.880	Good
12	Chest pas	0.455-0.780	0.738	Acceptable
13	Bounce pass	0.375-0.586	0.889	Good
14	Freetrow	0.568-0.798	0.793	Acceptable

The materials component offers training resources that cover basic to advanced techniques, game strategies, and tips for physical and mental development, aiding players in systematic skill improvement. The assessment section enables coaches to evaluate player performance in real-time, focusing on technical skills, speed, endurance, and tactics. Additionally, the evaluation feature provides detailed analysis of the collected data, helping coaches deliver specific feedback and create targeted training programs. Overall, BBTT not only measures performance but also supports continuous player development.

Good design in BBTT includes an intuitive user interface, relevant and functional features, and reliable system stability. Integrating features tailored to the needs of athletes and coaches enhances performance assessment, as technology in sports has been shown to improve athlete evaluation, which is crucial for their growth (Syahrudin et al., 2019). Additionally, clear presentation of assessment materials and ease of conducting evaluations are crucial for the application's overall effectiveness. A well-designed interface ensures that information is displayed clearly and supports users in making informed decisions based on accurate evaluation analysis (Divayana, 2023). Applications need to maintain stability to ensure they can be relied upon during crucial assessment periods. An iterative design process, which includes ongoing feedback from users, is vital for refining features and improving system reliability (Fagher et al., 2022).

The Effect Assessment Model for Talent Identification of Young Indonesian Before and After Development Basketball Talent Tracker (BBTT) Application

This research demonstrates a significant advancement in assessing young basketball players' skills by transitioning from manual methods to using the BBTT application.

Table 5. Result of Descriptive Statistic

Test	Item	n	Mean ± SD	Description
Anthropometers	Height (cm)	30	145.90 ± 9.81	Quite Talented
	Weight (kg)	30	44.30 ± 12.20	Quite Gifted
	Arm Span (cm)	30	150.60 ± 11.30	Talented
Biomotor	Multistage Fitness Test (times)	30	6.12 ± 0.55	Quite Gifted
	Soken (m)	30	5.85 ± 1.19	Less Talented
	Smart WBR 515-GM (sec)	30	0.25 ± 0.05	Quite Talented
Basketball Skill Test	Free throw (Number of Balls In)	30	6.15 ± 1.07	Quite Talented
	Dribbling (seconds) (speed and ball control)	30	10.50 ± 2.85	Talented
Tactical	Understand and apply the instructions given by the trainer (values)	30	5.50 ± 0.85	Quite Talented

SD: Standard deviation

Previously, manual assessments were time-consuming, subjective, and prone to human error. This traditional approach not only limited efficiency but also constrained coaches' ability to provide prompt and accurate feedback. In contrast, the BBTT application offers a much faster, easier, and more precise assessment process. It enables real-time data collection, automated analysis, and immediate result presentation, enhancing both the speed and accuracy of the evaluation. This shift has markedly improved the quality of assessments, benefiting player skill development and coaching efficiency.

Such technological integration supports findings that highlight the value of objective measures in sports performance evaluation, as subjective assessments often lead to inconsistent interpretations of player capabilities (Rösch et al., 2021a). The BBTT application represents a significant advancement in integrating technology into sports training and assessment. Studies have validated the reliability and effectiveness of digital assessment tools in measuring specific basketball skills and performance metrics (Quílez-Maimón et al., 2021a). For instance, the Q-Pass Index, a digital tool for assessing passing skills, demonstrates how technology can provide comprehensive evaluations that surpass traditional methods (Quílez-Maimón et al., 2021b). This is particularly relevant in basketball, where skill proficiency is crucial for player success.

Research has shown that agility is a vital attribute for young basketball players, with higher levels of agility correlating with better performance in competitive settings (Ribeiro Junior et al., 2019b). Accurate and timely assessments of agility and other physical attributes are facilitated by the BBTT application's real-time data collection and analysis capabilities. Furthermore, data analytics in sports has been found to enhance decision-making skills among athletes. By offering insights into performance, coaches can help players understand game situations better and improve their tactical awareness (A. Ramos et al., 2020). This holistic approach, which combines technical skill training with cognitive skill enhancement, is essential for developing well-rounded athletes capable of adapting to the dynamic nature of basketball (Lomangino, 2023).

In conclusion, transitioning from manual assessment methods to the BBTT application marks a significant improvement in evaluating young basketball players' skills. This shift enhances the efficiency and accuracy of assessments and fosters a more objective, data-driven approach to coaching. The advantages of real-time feedback, customized training plans, and increased player engagement highlight the importance of incorporating technology into sports training. As athletic development evolves, tools like the BBTT application will play a crucial role in shaping the future of coaching and player performance.

The Effectiveness of Basketball Talent Tracker (BBTT) Application

Based on the research results, particularly from the BBTT application trials, the application demonstrates significant effectiveness. Statistical tests and evaluations by media and material experts yielded favorable outcomes. This research highlights a notable shift in assessing young basketball players' skills, transitioning from manual methods to the BBTT application. Previously, assessments were conducted manually, which was time-consuming, subjective, and prone to human error. This approach was inefficient and restricted coaches' ability to provide timely and accurate feedback. With the introduction of the BBTT application, assessments have become considerably faster, easier, and more precise. The following illustrates the effectiveness of the BBTT application:

1. *Overcoming the Limitations of Manual Assessment:* The Basketball Talent Tracker (BBTT) application effectively addresses several limitations associated with manual assessment methods, including time consumption, potential human error, and subjectivity. Manual scoring can be time-consuming and labor-intensive, particularly when evaluating multiple players at once. The BBTT application improves efficiency and reliability by automating the scoring process, providing a more streamlined and accurate solution.

2. *Good Feature Design:* A key advantage of the BBTT application is its intuitive and functional design. The app features a user-friendly interface that accommodates trainers with varying levels of technological expertise. Its assessment and reporting modules are designed to be easily accessible, allowing users to fully leverage the application's capabilities. This results in a more organized and effective assessment process.

3. *Real-Time and Automated Scoring:* The BBTT application enables real-time, automatic player assessments, representing a significant advancement over manual methods. This functionality allows for immediate data collection and analysis as soon as an assessment is completed, providing coaches with instant results. This capability not only accelerates the assessment process but also enhances the accuracy of the results, as the data is evaluated objectively by the system.

4. *Ease in Data Collection, Analysis, and Evaluation:* The BBTT app offers tools that streamline the process of collecting, analyzing, and evaluating player performance data. By consolidating all data on a single platform that is accessible at any time, the app simplifies and integrates the evaluation process. The enhanced speed and accuracy of these evaluations enable coaches to deliver more relevant and detailed feedback, which is crucial for the players' skill development.

5. *Speed, Ease, and Accuracy of Assessment:* Since implementing BBTT, the assessment process has significantly improved in speed, ease, and accuracy. Coaches can now perform assessments more rapidly without sacrificing the quality or precision of the results. This efficiency accelerates decision-making in player coaching, which is vital in a competitive sports environment. These enhancements have been acknowledged by experts, as reflected in the positive ratings from media expert validation.

Research suggests that evaluating sports potential, including in basketball, should be multifaceted and dynamic, incorporating a range of tests to assess anthropometric, psychomotor, and skill-related attributes (Ribeiro Junior et al., 2019b). Comprehensive assessments are crucial for determining the most effective methods for developing young athletes and tracking their progress over time. The BBTT application supports these needs by offering a systematic approach to talent identification, which is vital in sports where early recognition of potential can greatly impact an athlete's career path (Till & Baker, 2020b). For instance, advancements in video-based assessments have been recognized for their ability to systematically observe decision-making in basketball scenarios, thereby enhancing the quality of feedback provided to athletes (Rösch et al., 2021b).

The findings indicate that the BBTT application greatly enhances the talent assessment process for young basketball players by addressing the shortcomings of manual methods. Its intuitive and user-friendly design simplifies the use of its features, while the real-time and automated assessment capabilities boost both efficiency and accuracy. Additionally, the streamlined data collection, analysis, and evaluation facilitated by BBTT enable coaches to deliver quicker and more precise feedback. These improvements accelerate the assessment process and enhance the quality and reliability of the results, as evidenced by the positive ratings from experts.

Conclusion

Based on the research findings, the following conclusions can be drawn: 1) The design and development of the BBTT application effectively serve as a tool for assessing the talents of young basketball players. This is supported by expert validation, which confirms that the BBTT application is both valid and suitable for use. 2) The application significantly enhances the effectiveness of assessments, offering faster, more precise, and accurate evaluations of young basketball players. 3) It also significantly impacts development and evaluation processes, particularly in identifying the potential of young athletes. Consequently, this research demonstrates that the BBTT application provides a valuable method for evaluating young basketball players and fostering the development of talented athletes.

Conflict of Interests

Authors have no conflict of interests.

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References

- Ardha, M. A. A., Nurhasan, N., Nur, L., Chaeroni, A., Bikalawan, S. S., & Yang, C. B. (2024a). Analysis of Android-Based Applications in Physical Education and Sports: Systematic Review | Análisis de Aplicaciones Basadas en Android en Educación Física y Deportes: Revisión Sistemática. *Retos*, *57*, 390–398.
- Ardha, M. A. A., Nurhasan, N., Nur, L., Chaeroni, A., Bikalawan, S. S., & Yang, C. B. (2024b). Analysis of Android-Based Applications in Physical Education and Sports: Systematic Review | Análisis de Aplicaciones Basadas en Android en Educación Física y Deportes: Revisión Sistemática. *Retos*, *57*, 390–398.
- Arede, J., Fernandes, J., Moran, J., Norris, J., & Leite, N. (2021). Maturity timing and performance in a youth national basketball team: Do early-maturing players dominate? *International Journal of Sports Science & Coaching*, *16*(3), 722–730. <https://doi.org/10.1177/1747954120980712>
- Baena-Raya, A., Díez-Fernández, D. M., Martínez-Rubio, C., Conceição, F., & López-Sagarra, A. (2024). Kinetic and Kinematic Characteristics Underpinning Change of Direction Performance in Basketball: A Comparative Study Between Sexes and Tests. *Journal of Strength & Conditioning Research*, *38*(4), e182–e188. <https://doi.org/10.1519/JSC.0000000000004693>
- Bahtra, R., Tohidin, D., Andria, Y., Dinata, W. W., & Susanto, N. (2023). Small-Side Games 5V5: Improving Aerobic Endurance of Youth Football Players. *Physical Education Theory and Methodology*, *23*(5), 739–746. <https://doi.org/10.17309/tmfv.2023.5.12>
- Befus, K., McDonough, M. H., Räisänen, A. M., Owoeye, O. B. A., Pasanen, K., & Emery, C. A. (2021). Player adherence to SHRed injuries Basketball neuromuscular training warm-up program: Can exercise fidelity be objectively measured? *Translational Sports Medicine*, *4*(6), 817–825. <https://doi.org/10.1002/tsm2.285>
- Chomatek, Ł., & Sierakowska, K. (2021). Automation of basketball match data management. *Information (Switzerland)*, *12*(11). <https://doi.org/10.3390/info12110461>
- Divayana, D. G. H. (2023). User Interface Design for DIVAYANA Evaluation Application Based on Positive-Negative Discrepancy. *Journal of Applied Data Sciences*, *4*(4), 317–332. <https://doi.org/10.47738/jads.v4i4.136>

Epure, M., & Bădău, D. (2021). The Importance of the Selection Process in Basketball. The Analysis of the Specialists' Opinion. *Bulletin of the Transilvania University of Braşov Series IX Sciences of Human Kinetics*, 14(63)(2), 55–62. <https://doi.org/10.31926/but.shk.2021.14.63.2.6>

Fagher, K., Kunorozva, L., Badenhorst, M., Derman, W., Kissick, J., Verhagen, E., Ahmed, O. H., Jederström, M., Heron, N., Khoshnood, A. M., Silva, A., Kenttä, G., & Lexell, J. (2022). Safe and Healthy Para sport project (SHAPE): a study protocol of a complex intervention within Para sport. *BMJ Open Sport & Exercise Medicine*, 8(3), e001392. <https://doi.org/10.1136/bmjsem-2022-001392>

Hidayah, T., Saghita Pratama, R., Rahayu, S., Budiono, I., Nadzalan, A., Hafidz, A., Purwoto, S. P., & Nurrahmad, L. (2024). Do Petanque Sports Athletes in Jawa Tengah Need Android-Based Applications for Training Program Implementation? *Retos*, 53, 69–77. <https://recyt.fecyt.es/index.php/retos/index>

Januarianto, F. A., & Warthadi, A. N. (2023). Analisis Tingkat Kebugaran Jasmani Siswa Sekolah Menengah Kejuruan Muhammadiyah 1 Sukoharjo. *Jambura Journal of Sports Coaching*, 5(2), 149-154.

Jariono, G., Indarto, P., Sistiasih, V. S., Nugroho, H., & Maslikah, U. (2024). Physical Activity Training Methods to Improve the Physical Condition of Volleyball Players: A Systematic Review. *Physical Education Theory and Methodology*, 24(1), 118-129.

Jing, Z. (2023). Influences of balance training on shooting quality in basketball players. *Revista Brasileira de Medicina Do Esporte*, 29. https://doi.org/10.1590/1517-8692202329012023_0010

Kalén, A., Padrón-Cabo, A., Lundkvist, E., Rey, E., & Pérez-Ferreirós, A. (2021). Talent Selection Strategies and Relationship With Success in European Basketball National Team Programs. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.666839>

Khan, N. J., Ahamad, G., & Naseem, M. (2022). An IoT/FOG based framework for sports talent identification in COVID-19 like situations. *International Journal of Information Technology (Singapore)*, 14(5), 2513–2521. <https://doi.org/10.1007/s41870-022-00984-z>

Leyhr, D., Bergmann, F., Schreiner, R., Mann, D., Dugandzic, D., & Höner, O. (2021). Relative Age-Related Biases in Objective and Subjective Assessments of Performance in Talented Youth Soccer Players. *Frontiers in Sports and Active Living*, 3(May). <https://doi.org/10.3389/fspor.2021.664231>

Loia, V., & Orciuoli, F. (2019). ICTs for exercise and sport science: Focus on augmented reality. *Journal of Physical Education and Sport*, 19(5), 1740–1747. <https://doi.org/10.7752/jpes.2019.s5254>

Lomangino, C. (2023). *The impact interscholastic sports participation has on student-athlete development and transferability of important life skills to youth development from the perception of coaches and parents [Thesis]*. New York, NY: St. John's University.

Meisel, P. L., DiFiori, J. P., Côté, J., Nguyen, J. T., Brenner, J. S., Malina, R. M., Ryan, E., & Güllich, A. (2022). Age of Early Specialization, Competitive Volume, Injury, and Sleep Habits in Youth Sport: A Preliminary Study of US Youth Basketball. *Sports Health: A Multidisciplinary Approach*, 14(1), 30–44. <https://doi.org/10.1177/194173812111056301>

Mulya, G., Lengkana, A. S., & Agustriyani, R. (2021). Tennbastech: A scientific approach to teach tennis. *International Journal of Human Movement and Sports Sciences*, 9(6), 1371–1382. <https://doi.org/10.13189/saj.2021.090633>

O. A. S. Rapidah, et al. (2018). Special issue. Special issue. *Journal of Fundamental and Applied Sciences*, 4(1), 9–10.

Parra-Martinez, F. A., & Wai, J. (2023). Talent identification research: a bibliometric study from multidisciplinary and global perspectives. *Frontiers in Psychology*, 14(May), 1-22. <https://doi.org/10.3389/fpsyg.2023.1141159>

Pino-Ortega, J., Rojas-Valverde, D., Gómez-Carmona, C. D., & Rico-González, M. (2021a). Training Design, Performance Analysis, and Talent Identification-A Systematic Review about the Most Relevant Variables through the Principal Component Analysis in

Soccer, Basketball, and Rugby. *International Journal of Environmental Research and Public Health*, 18(5), 2642. <https://doi.org/10.3390/ijerph18052642>

Pino-Ortega, J., Rojas-Valverde, D., Gómez-Carmona, C. D., & Rico-González, M. (2021b). Training Design, Performance Analysis, and Talent Identification—A Systematic Review about the Most Relevant Variables through the Principal Component Analysis in Soccer, Basketball, and Rugby. *International Journal of Environmental Research and Public Health*, 18(5), 2642. <https://doi.org/10.3390/ijerph18052642>

Post, E. G., Rosenthal, M. D., Root, H. J., & Rau, M. J. (2021). Sport Specialization Behaviors Are Associated With History of Reported Injury in Youth Basketball. *Journal of Pediatric Orthopaedics*, 41(8), 507–513. <https://doi.org/10.1097/BPO.0000000000001908>

Quílez-Maimón, A., Rojas-Ruiz, F. J., Delgado-García, G., & Courel-Ibáñez, J. (2021a). The Q-Pass Index: A Multifactorial IMUs-Based Tool to Assess Passing Skills in Basketball. *Sensors*, 21(13), 4601. <https://doi.org/10.3390/s21134601>

Quílez-Maimón, A., Rojas-Ruiz, F. J., Delgado-García, G., & Courel-Ibáñez, J. (2021b). The Q-Pass Index: A Multifactorial IMUs-Based Tool to Assess Passing Skills in Basketball. *Sensors*, 21(13), 4601. <https://doi.org/10.3390/s21134601>

Quílez-Maimon, A., Siquier-Coll, J., Nadal, C. A., Clemente, F. M., & González-Fernandez, F. T. (2023). Relationship Between Talent Identification and Change of Direction in Young Basketball Players. *Physical Education Theory and Methodology*, 23(1), 133-142. <https://doi.org/10.17309/tmfv.2023.1.19>

Ramos, A., Coutinho, P., Davids, K., & Mesquita, I. (2020). Developing Players' Tactical Knowledge Using Combined Constraints-Led and Step-Game Approaches-A Longitudinal Action-Research Study. *Research Quarterly for Exercise and Sport*, 1-15. <https://doi.org/10.1080/02701367.2020.1755007>

Ramos, S., Volossovitch, A., Ferreira, A. P., Fragoso, I., & Massuça, L. (2019). Differences in maturity, morphological and physical attributes between players selected to the primary and secondary teams of a Portuguese Basketball elite academy. *Journal of Sports Sciences*, 37(15), 1681–1689. <https://doi.org/10.1080/02640414.2019.1585410>

Ramos, S., Volossovitch, A., Ferreira, A. P., Fragoso, I., & Massuça, L. M. (2021). Training experience and maturational, morphological, and fitness attributes as individual performance predictors in male and female under-14 portuguese elite basketball players. *Journal of Strength and Conditioning Research*, 35(7), 2025–2032. <https://doi.org/10.1519/JSC.0000000000003042>

Ribeiro Junior, D. B., Vianna, J. M., Lauria, A. de A., Coelho, E. F., & Werneck, F. Z. (2019a). Sports potential modeling of young basketball players: a preliminary analysis. *Revista Brasileira de Cineantropometria & Desempenho Humano*, 21. <https://doi.org/10.1590/1980-0037.2019v21e59832>

Ribeiro Junior, D. B., Vianna, J. M., Lauria, A. de A., Coelho, E. F., & Werneck, F. Z. (2019b). Sports potential modeling of young basketball players: a preliminary analysis. *Revista Brasileira de Cineantropometria & Desempenho Humano*, 21. <https://doi.org/10.1590/1980-0037.2019v21e59832>

Rösch, D., Schultz, F., & Höner, O. (2021a). Decision-Making Skills in Youth Basketball Players: Diagnostic and External Validation of a Video-Based Assessment. *International Journal of Environmental Research and Public Health*, 18(5), 2331. <https://doi.org/10.3390/ijerph18052331>

Rösch, D., Schultz, F., & Höner, O. (2021b). Decision-Making Skills in Youth Basketball Players: Diagnostic and External Validation of a Video-Based Assessment. *International Journal of Environmental Research and Public Health*, 18(5), 2331. <https://doi.org/10.3390/ijerph18052331>

Simmons, A. J. (2019). *Computational Pipelines for Spatio-Temporal Analysis of Team Invasion Games*.

Subekti, N., Syaukani, A. A., Fatoni, M., Subroto, S., & Raihan, A. A. D. A. (2021). Exercise Speed, Agility and Quickness (SAQ) To Improve Physical Fitness. *Kinestetik: Jurnal Ilmiah Pendidikan Jasmani*, 5(1), 95-101.

Soares, A. A. L., Lima, A. B., Miguel, C. G., Galvão, L. G., Leonardi, T. J., Paes, R. R., Gonçalves, C. E., & Carvalho, H. M. (2023). Does early specialization provide an advantage in physical fitness development in youth basketball? *Frontiers in Sports and Active Living*, 4. <https://doi.org/10.3389/fspor.2022.1042494>

Susanto, N., Dinata, W. W., Ihsan, N., Bahtra, R., Andria, Y., Pranoto, N. W., Anam, K., Sofyan, D., Lourenço, C. C. V., Burhaein, E., García-Jiménez, J. V., & Setyawan, H. (2023). Instrument for Assessing Basketball Skills in Junior High School Students in Indonesia. *Journal of Physical Education and Sport*, 23(12), 3220–3227. <https://doi.org/10.7752/jpes.2023.12368>

Susanto, N., García-Jiménez, J. V., Nowak, A. M., Setyawan, H., Pavlovic, R., Rusdiawan, A., & Syaukani, A. A. (2024). Development Assessment Model for Talent Identification of Young Indonesian Basketball Players: Anthropometrics, Biomotor, Technical, and Tactical Skills. *International Journal of Human Movement and Sports Sciences*, 12(4), 625–635. <https://doi.org/10.13189/saj.2024.120403>

Syahrudin, S., Imam, I., Lungit, L., Ramdan, R., & Bagus, B. (2019). Infrared Sensor Technology (IST) Test as a Tool for Assessment of Flexibility. *Advances in Rehabilitation*, 2019(3), 5–9. <https://doi.org/10.5114/areh.2019.87743>

Till, K., & Baker, J. (2020a). Challenges and [Possible] Solutions to Optimizing Talent Identification and Development in Sport. *Frontiers in Psychology*, 11(April), 1–14. <https://doi.org/10.3389/fpsyg.2020.00664>

Till, K., & Baker, J. (2020b). Challenges and [Possible] Solutions to Optimizing Talent Identification and Development in Sport. *Frontiers in Psychology*, 11. <https://doi.org/10.3389/fpsyg.2020.00664>

Torres-Ronda, L., Beanland, E., Whitehead, S., Sweeting, A., & Clubb, J. (2022). Tracking Systems in Team Sports: A Narrative Review of Applications of the Data and Sport Specific Analysis. *Sports Medicine - Open*, 8(1). <https://doi.org/10.1186/s40798-022-00408-z>

Xu, K., Li, Y., Liu, C., Liu, X., Hao, X., Gao, J., & Maropoulos, P. G. (2020). Advanced Data Collection and Analysis in Data-Driven Manufacturing Process. *Chinese Journal of Mechanical Engineering (English Edition)*, 33(1). <https://doi.org/10.1186/s10033-020-00459-x>

Zanada, J. F. (2023). The effect of circuit training program on physical fitness level in volleyball club athletes IPK Kuamang. *Fizjoterapiapolska*, 23(3), 120–124. <https://doi.org/DOI: 10.56984/8ZG143IT9>