Scientific Evaluation of Player Positioning: A Measurement Tool for U-16 Football Players in Semarang

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HOW TO CITE:

Yudhi Purnama, Tandiyo Rahayu, Taufiq Hidayah, Soedjatmiko, Mugiyo Hartono, Heny Setyawati (2026). Scientific Evaluation of Player Positioning: A Measurement Tool for U-16 Football Players in Semarang International Journal of Special Education, 41(20s), 530 - 543

ABSTRACT:

The main issue addressed in this study is the lack of objective, reliable tools for accurately determining player positions in youth football. Accurately identifying player positions is critical for optimizing individual development and enhancing overall team performance. This study aims to evaluate the effectiveness of a newly developed scientific measurement instrument designed to determine appropriate playing positions for U-16 youth football players in Semarang City. This study used a quantitative, quasi-experimental approach involving 40 male players aged 15 to 16 years. The instrument assesses four key domains: technical proficiency, tactical awareness, physical performance, and psychological attributes. Data collection involved initial position assessments conducted by coaches, followed by post-assessments using the instrument. Confirmatory Factor Analysis (CFA) was conducted to establish construct validity, while Cronbach's Alpha was used to assess reliability. Paired-sample t-tests were utilized to compare player performance before and after the intervention. The results indicated strong validity (CFI = 0.931; RMSEA = 0.039) and high reliability ($\alpha = 0.918$). Significant improvements were observed post-intervention, with an average 17.2% increase in performance metrics such as successful passes, defensive plays, and goal contributions ($p < 0.01$). Additionally, coaches reported enhanced confidence in assigning player positions based on the instrument's output. These findings demonstrate that the scientific measurement instrument is effective in improving the accuracy of position determination among U-16 football players in Semarang City and offers a valuable, evidence-based tool for youth football academies to optimize talent placement and player development.

Keywords: Player Positioning, Youth Football, Performance Assessment, Measurement Instrument.

Introduction

In contemporary youth football, particularly at the U-16 developmental stage, the accurate assignment of players to appropriate positions is a critical factor in optimizing both individual development and overall team performance (Currie & MacFarlane, 2018). Football at this stage plays a foundational role in shaping technical skills, tactical awareness, and long-term athletic potential. However, in many grassroots environments, including football schools and academies, player positioning decisions are often based on subjective coaching judgment rather than systematic evaluation (Kothroulas et al., 2025; Santos et al., 2024).

While experienced coaches may rely on intuition and observational insights, over-reliance on such subjective methods can result in misaligned placements, ultimately hindering team dynamics and the holistic development of young athletes (Gandrapu & Rakesh, 2024; Simon, 2024). As highlighted by Larkin and O'Connor (2017), the lack of objective, evidence-based tools in grassroots football presents a persistent challenge to talent identification and role assignment (Alder, 2025; Duncan et al., 2022).

Recent advancements in sports science advocate more structured, multidimensional approaches to player assessment. Studies emphasize that player suitability should not be judged solely on technical skills but should encompass tactical understanding, physical attributes, and psychological readiness (Larkin & O'Connor, 2017). For example, (Dello Iacono et al., 2021; Silva et al., 2025) suggest that integrated testing including small-sided games and cognitive profiling offers more precise insights into a player's positional aptitude. Additionally, research by Deprez et al. (2015) and De Haan et al. (2025) underscores the substantial variation in physical and physiological demands across different playing positions, reinforcing the importance of role-specific evaluation. Psychological components such as motivation, resilience, and mental toughness have also been identified as key predictors of performance success in youth athletes, supporting the adoption of a bio-psychosocial model in player assessment (Bergeron et al., 2015; Wiese-Bjornstal et al., 2020).

Despite this growing body of evidence, many developing football academies, particularly in Indonesia, still have limited implementation of holistic, evidence-based evaluation systems. Youth Football in Semarang City, a developing academy with a growing commitment to professionalizing its training approach, exemplifies this challenge. There is currently a gap between modern assessment models recommended by global organizations such as FIFA and the tools actually employed at the grassroots level.

To address this gap, the present study introduces a newly developed scientific measurement instrument designed to determine player positions based on four core components: technical skills, tactical cognition, physical capabilities, and psychological readiness. This instrument is aligned with FIFA's player development framework and aims to bring scientific rigor to youth football talent identification.

The primary objective of this research is to evaluate the effectiveness of the instrument in accurately identifying suitable playing positions for U-16 athletes in Youth Football Semarang City. The findings of this study are expected to provide valuable insights for grassroots football programs seeking to modernize their player development systems and implement more objective, data-driven approaches to talent management.

2. Methodology

Participants

This research and development (R&D) study involved four participant groups aligned with the product development stages. First, expert validation was conducted by three validators (n = 3): one football content expert from academia, one soccer coaching practitioner holding a recognized coaching license , and one media/IT expert. Next, a small-scale trial was carried out with U16 football school (SSB) players in Semarang City (n = 20) and coaches (n = 2) to examine initial feasibility, user acceptance, and the consistency of implementing the skill-testing battery and using the web-based application. A large-scale trial then involved additional U16 SSB players (n = 40) and coaches (n = 4) to evaluate broader acceptance and field implementation of the instrument and application. To assess effectiveness, six teams (T1–T6) participated in pretest and posttest matches, where goal differentials were recorded before and after the application-based position recommendations were applied; effectiveness was quantified using the N-Gain score approach.

Inclusion criteria for players were: registered and actively training U16 SSB athletes who were medically and physically fit to complete the full on-field testing protocol on the day of data collection and who attended the standardized briefing on test procedures before assessment. Exclusion criteria included: athletes with acute injuries or medical conditions that could increase risk during testing, athletes who could not complete the full test battery, and athletes with incomplete or invalid data that could not be processed for analysis or entered into the application. For coaches, inclusion criteria were: active U16 SSB coaches who agreed to implement the instrument and application for trial and evaluation purposes. Coaches were excluded if they did not complete the required evaluation forms and acceptance questionnaires needed for the development and assessment stages.

Research Design

This research and development (R&D) study used the 4D model (Define, Design, Develop, and Disseminate) to produce and evaluate a web-based decision-support instrument for assigning playing positions to U16 football school (SSB) athletes. In the Define phase, a needs assessment was conducted through coach questionnaires and stakeholder interviews to identify how U16 player positions were typically assigned in practice and to confirm the demand for a more objective, data-driven approach; results indicated that many coaches still relied primarily on players' initial roles and coaching intuition rather than standardized decision-support. In the Design phase, a literature-informed mapping of position-specific indicators was used to define the most relevant skill domains for U16 positions (Goalkeeper, Centre Back, Full Back/Defender Left–Right, Central Midfielder, Wide Midfielder, Winger, and Striker), resulting in an 18-item field-test battery covering both technical and physical components (acceleration, agility, ball control, composure, crossing, dribbling, heading, interception, jumping, long passing, long shooting, marking, positioning, reaction, short passing, speed, stamina, and strength).

In parallel, the study designed the "Purnama Get Position" web application with three core functions: a dashboard, a test-instrument guidance menu (procedures and scoring), and a position-check module that allows coaches to enter player identity data and skill scores and receive up to three best-fit position recommendations; the application was intended for online access via computer or mobile device with email-based login. In the Develop phase, the instrument and application were evaluated through expert validation by three validators (football academic expert, licensed coaching practitioner, and media/IT expert), followed by a small-scale trial with U16 players (n = 20) and coaches (n = 2), and then a large-scale trial with U16 players (n = 40) and coaches (n = 4) to assess feasibility, acceptance, and implementation; item validity was examined using Pearson product–moment correlations and internal consistency reliability using Cronbach's alpha, while user acceptance was gathered via questionnaires. Product revisions were then implemented based on feedback, including clearer sourcing for each test, improved clarity for composure/ball-control-under-pressure elements, refined scoring ranges, the ability to save/print outputs, more user-friendly input ordering, and simplified access via email login. Finally, in the Disseminate phase, the planned outputs were the public-facing web application and a practical user guide to support broader adoption by U16 SSB coaches and athletes.

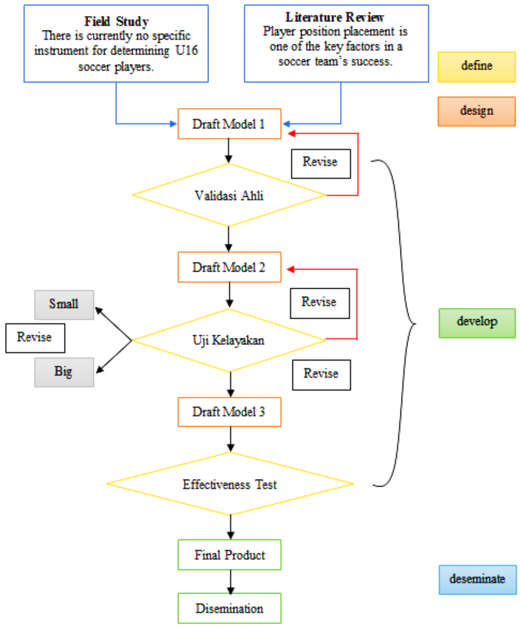

Figure 1. Research Flow

Statistical Analysis

Analyses were conducted using IBM SPSS Statistics version 25 and descriptive calculations consistent with the development evaluation plan, with statistical significance set at $p < 0.05$. Expert-validation feasibility was calculated by converting each validator's ratings into percentage scores and computing the mean percentage across validators. During the small-scale trial, item validity was examined using Pearson product–moment item–total correlations after standardizing all indicators to a 1–10 scoring scale and applying reverse-coding, when needed, for time-based indicators so that higher scores consistently reflected better performance; items were considered acceptable when the correlation coefficient exceeded the critical r value at $\alpha = 0.05$. Internal consistency reliability of the 18-item battery was evaluated using Cronbach's alpha, with $\alpha \geq 0.60$ considered acceptable for an early-stage development instrument. User acceptance among players and coaches was summarized as frequencies and percentages across response categories (strongly agree, agree, disagree, strongly disagree), and the mean acceptance score was interpreted using the predefined acceptance category scale. Effectiveness was assessed using an N-Gain approach based on pretest and posttest goal-difference (GD) outcomes, where GD was defined as goals for minus goals against. Because GD can take negative values, GD scores were rescaled to a non-negative range prior to N-Gain computation using Scaled GD = GD + 3 (based on the minimum observed GD of −3), and the ideal (maximum) scaled score was set to 8 (based on the maximum observed GD of +5). N-Gain was then computed as N-Gain = (Post_scaled − Pre_scaled) / (8 − Pre_scaled) and interpreted as low (< 0.30), moderate (0.30–0.70), or high (> 0.70). N-Gain percentage values were interpreted using the predefined effectiveness criteria.

3. Results

The development process produced (1) a web-based decision-support application ("Purnama Get Position") and (2) a position-specific football (soccer) skill-testing battery for U16 SSB athletes. The application includes a dashboard, an instrument-guidance menu, and a position-check module that generates up to three best-fit position recommendations after coaches enter player data and standardized skill scores (Figure 2).

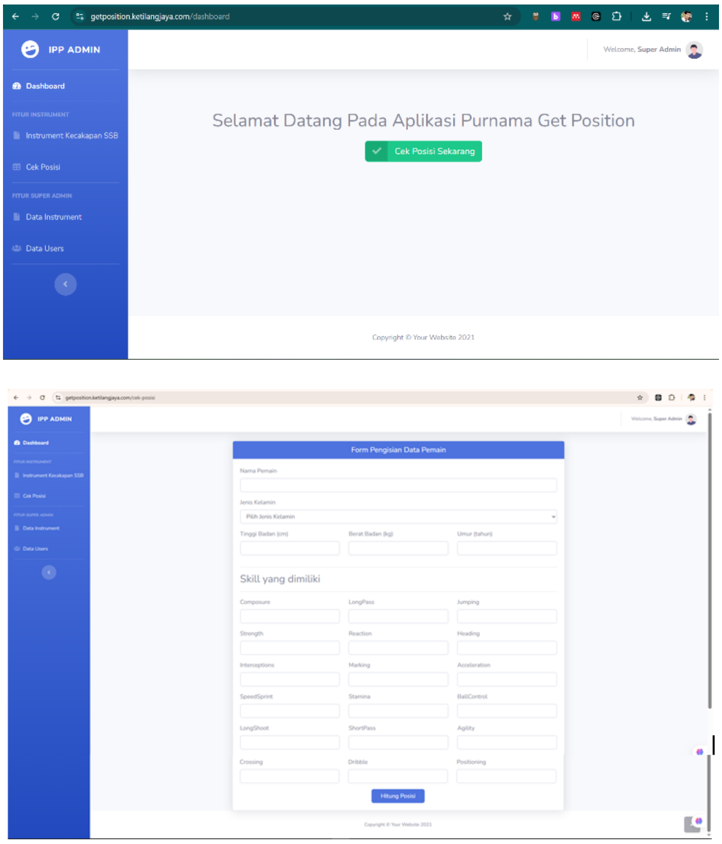

Figure 2. Screenshots of the "Purnama Get Position" web application interface (dashboard, instrument guidance, and position-check module)

During the Define phase, coach interviews indicated that U16 playing positions were commonly assigned based on athletes' initial roles and coach intuition, with limited use of standardized, data-driven decision support. During the Design phase, position-specific indicators were mapped from the literature and linked to field-test procedures to form an 18-item battery spanning technical and physical components; the finalized mapping of positions, indicators, and adopted field tests is presented in Table 1.

Table 1. Position-specific indicators and field-test sources used to build the instrument

Position	Key indicators and field tests (with sources)
Goalkeeper (GK)	Composure – Small-sided games composure test (Piggott et al., 2019)Long pass – Loughborough Football Passing Test/LSPT (Zambak, 2019)Jumping – Vertical jump (Menzel et al., 2013)Strength – Squat jump (Marques & González-Badillo, 2011)Reaction – Wall ball test (Eckner et al., 2010)
Centre Back (CB)	Heading – Target-based heading test (Kern et al., 2024)Interceptions – Small-sided game interception (Khurrohman et al., 2021)Jumping – Vertical jump (Menzel et al., 2013)Marking – Small-sided game marking (Ngo et al., 2012)Strength – Squat jump (Marques & González-Badillo, 2011)

Full Back / Defender Left–Right (DL/DR)	Acceleration – Sprint acceleration test (W. Setiawan et al., 2021)Long pass – LSPT (Zambak, 2019)Speed – 40-m sprint test (Altmann et al., 2024)Stamina – Bleep test (Peumal Senanayake General Sir John, 2023)
Central Midfielder (MC)	Ball control – Juggling test (Raastad et al., 2016)Long pass – LSPT (Zambak, 2019)Long shot – Shooting test (Engler et al., 2023)Short pass – Short pass test (BenOunis et al., 2013)Stamina – Bleep test (Peumal Senanayake General Sir John, 2023)
Wide Midfielder (ML/MR)	Acceleration – Sprint acceleration test (W. Setiawan et al., 2021)Agility – T-test (Aldo Lanrey Royanto Malau et al., 2023)Crossing – Crossing test (Vantarakis & Stafylidis, 2023)Dribbling – Dribbling test (Duncan et al., 2021)Speed – 40-m sprint test (Altmann et al., 2024)
Winger Left–Right (WL/WR)	Acceleration – Sprint acceleration test (W. Setiawan et al., 2021)Crossing – Crossing test (Vantarakis & Stafylidis, 2023)Long shot – Shooting test (Engler et al., 2023)Dribbling – Dribbling test (Duncan et al., 2021)Positioning – Small-sided game positioning (Katis & Kellis, 2009)
Striker (ST)	Acceleration – Sprint acceleration test (W. Setiawan et al., 2021)Composure – Small-sided games composure test (Piggott et al., 2019)Heading – Target-based heading test (Kern et al., 2024)Long shot – Shooting test (Engler et al., 2023)Positioning – Small-sided game positioning (Katis & Kellis, 2009)

Following design finalization, the Develop phase began with expert validation. Three validators (football academic expert, licensed coaching practitioner, and media/IT expert) evaluated the feasibility and suitability of the instrument and application. Expert ratings indicated high feasibility, with a mean feasibility score of 90.67% (Table 2). Validators recommended several refinements, including explicitly citing the adopted sources for each field test, clarifying operational definitions for ball-control/composure under pressure, standardizing the scoring range to 1–10, and enabling the position-check output to be saved or printed.

Table 2. Expert validation (feasibility) results

Validator	Feasibility score (%)
Football content expert (academia)	90.00
Football coaching expert (licensed practitioner)	92.00
Media/IT expert	90.00
Mean across experts	**90.67**

In the small-scale trial (players, n = 20; coaches, n = 2), players completed the 18-item battery using the standardized 1–10 scoring system. Descriptive statistics for the small-scale dataset are reported in Table 3. Item validity was examined using Pearson item–total correlations at $\alpha = 0.05$ ($r_{critical} = 0.444$ for $n = 20$). Items that met the criterion are indicated in Table 4, while items that did not meet the criterion were retained for early-stage development based on content relevance to position demands and field practicality, and were targeted for refinement in subsequent studies. Internal consistency reliability of the 18-item battery was acceptable for early-stage development (Cronbach's alpha ≥ 0.60), as shown in Table 5.

Table 3. Small-scale trial (n = 20): descriptive statistics for each indicator (1–10 scale)

Indicator	Mean	SD	Min	Max
Acceleration	8.70	1.30	6.00	10.00
Agility	6.90	2.15	2.00	10.00
Ball Control	4.70	3.27	1.00	10.00
Composure	7.10	1.34	4.00	9.00
Crossing	5.35	2.11	2.00	9.00
Dribble	6.35	2.76	1.00	10.00
Heading	6.20	1.91	2.00	9.00
Interception	6.90	1.50	3.00	9.00
Jumping	5.05	1.14	3.00	7.00
Long Pass	6.10	2.24	3.00	10.00
Long Shoot	6.05	2.06	3.00	9.00
Marking	6.45	1.76	3.00	9.00
Positioning	7.25	1.17	5.00	9.00
Reaction	6.55	1.85	4.00	10.00
Short Pass	6.10	2.38	1.00	10.00
Speed	8.10	2.01	3.00	10.00
Stamina	6.85	1.54	5.00	10.00
Strength	5.85	2.49	1.00	9.00

Table 4. Small-scale trial (n = 20): Pearson item–total correlations ($\alpha = 0.05$; $r_{critical} = 0.444$)

Indicator	r (item–total)	p value	Meets criterion ($r \geq 0.444$ and $p < 0.05$)
Acceleration	0.557	0.011	Yes
Agility	0.557	0.011	Yes
Ball Control	0.265	0.260	No
Composure	0.651	0.002	Yes
Crossing	0.278	0.235	No
Dribbling	0.464	0.039	Yes

Heading	0.086	0.720	No
Interception	0.525	0.017	Yes
Jumping	0.249	0.290	No
Long Pass	−0.216	0.361	No
Long Shot	−0.294	0.208	No
Marking	0.189	0.424	No
Positioning	−0.127	0.593	No
Reaction	0.386	0.092	No
Short Pass	0.490	0.028	Yes
Speed	0.542	0.014	Yes
Stamina	−0.441	0.051	No
Strength	0.502	0.024	Yes

Table 5. Small-scale trial (n = 20): internal consistency reliability (18 items)

Reliability metric	Value	Interpretation	Reliability metric
Cronbach's alpha (18 items)	0.641	Acceptable for early-stage development ($\alpha \geq 0.60$)	Cronbach's alpha (18 items)

User acceptance was positive in both field trials. In the small-scale trial, athletes reported 58.5% "strongly agree" and 41.5% "agree," with no negative responses recorded. Coaches also reported favorable acceptance of the web application and its practicality for field use, with item-level counts presented in Table 6. In the large-scale trial (players, n = 40; coaches, n = 4), athlete acceptance remained high, with responses concentrated in "strongly agree" and "agree," and minimal "disagree" responses (Table 7). Coach acceptance likewise remained positive, with most responses recorded as "agree" and a smaller number as "strongly agree," alongside limited "disagree" responses on selected practicality items (Table 8).

Table 6. Small-scale trial (coaches, n = 2): acceptance of the web-based application

Item	Strongly agree	Agree	Disagree	Strongly disagree
The test instrument is easy to understand and use	1	1	0	0
The data-entry instructions are clear	1	1	0	0
The instrument is appropriate for evaluating player decision making	2	0	0	0
Each indicator is relevant to football play	0	2	0	0
The instrument helps coaches make selection decisions	2	0	0	0
Time required is reasonable	0	2	0	0
Format and display support field use	0	2	0	0

I am willing to use this instrument in selection	0	2	0	0
The instrument increases objectivity in evaluation	1	1	0	0
Overall, I am satisfied with the instrument	0	2	0	0

Effectiveness was evaluated using an N-Gain approach based on pretest versus posttest match goal-difference (GD) outcomes after applying the application's position recommendations. N-Gain category criteria and percentage interpretation criteria are provided in Tables 9 and 10. Pretest and posttest match scores and their corresponding GD values are presented in Table 11. N-Gain values were computed using scaled GD (Scaled GD = GD + 3) with an ideal scaled score of 8, and the results are reported in Table 12. The mean N-Gain score was 0.62 (62.22%), indicating an effective improvement in goal-difference outcomes according to the predefined interpretation criteria.

Table 7. Large-scale trial (players, n = 40): acceptance of the skill-testing instrument

Item	Strongly agree	Agree	Disagree	Strongly disagree
Easy to understand and use	20	20	0	0
Reflects skills needed in football	18	22	0	0
Test instructions are clear and easy to follow	25	15	0	0
Sufficient time to complete the tests	16	19	5	0
Motivates players to train harder	30	10	0	0
Test equipment is easy to obtain	17	20	3	0
Assesses objectively	28	12	0	0
Results reflect true ability	21	19	0	0
Willing to use the instrument for selection	20	19	1	0
Willing to use the instrument in future training	24	15	1	0

Table 8. Large-scale trial (coaches, n = 4): acceptance of the web-based application

Item	Strongly agree	Agree	Disagree	Strongly disagree
The test instrument is easy to understand and use	2	2	0	0
The data-entry instructions are clear	3	1	0	0
The instrument is appropriate for evaluating player decision making	2	2	0	0
Each indicator is relevant to football play	1	3	0	0
The instrument helps coaches make selection decisions	2	1	1	0

Time required is reasonable	1	2	1	0
Format and display support field use	0	4	0	0
I am willing to use this instrument in selection	1	2	1	0
The instrument increases objectivity in evaluation	1	3	0	0
Overall, I am satisfied with the instrument	0	4	0	0

Table 9. N-Gain category criteria

N-Gain value	Category
N-Gain < 0.30	Low
0.30 ≤ N-Gain ≤ 0.70	Moderate
N-Gain > 0.70	High

Table 10. N-Gain percentage interpretation criteria

N-Gain (%)	Interpretation
< 40%	Not effective
40–55%	Less effective
56–75%	Effective
> 75%	Highly effective

Table 11. Pretest and posttest match scores and goal-difference (GD) basis for effectiveness assessment

Team	Pretest score	Posttest score	Pretest GD	Posttest GD
T1	2:1	4:1	1	3
T2	2:3	3:1	-1	2
T3	4:2	5:1	2	4
T4	0:1	3:0	-1	3
T5	2:2	5:3	0	2
T6	1:4	5:0	-3	5

(GD = goals for − goals against.)

Table 12. N-Gain effectiveness results based on scaled goal-difference outcomes

(Ideal scaled score = 8)

Team	Pretest GD	Posttest GD	Pretest (scaled GD)	Posttest (scaled GD)	Δ (Post–Pre)	N-Gain	N-Gain (%)
T1	1	3	4	6	2	0.50	50.00
T2	-1	2	2	5	3	0.50	50.00
T3	2	4	5	7	2	0.67	66.67
T4	-1	3	2	6	4	0.67	66.67
T5	0	2	3	5	2	0.40	40.00
T6	-3	5	0	8	8	1.00	100.00
Mean	-0.33	3.17	2.67	6.17	3.50	**0.62**	**62.22**

(Scaled GD = GD + 3; Ideal scaled score = 8.)

Finally, revisions implemented after field trials included renaming the product to "Purnama Get Position," reordering the input sequence in the position-check menu to improve usability, raising the threshold score for position recommendations, and simplifying access from registration-based entry to email-based login. The finalized product therefore consisted of the position indicator framework, the 18-item field-test battery, and the web application for data entry and position recommendation, as summarized in Table 1.

4. Discussion

This study developed and field-tested a web-based decision-support instrument ("Purnama Get Position") to recommend playing positions for U16 football school (SSB) athletes by integrating a position-specific, field-based skill-testing battery with a practical application interface. The development rationale aligns with established evidence that match demands and performance actions vary by playing position, meaning that position assignment should be grounded in position-relevant indicators rather than generalized impressions alone (Di Salvo et al., 2010).

Overall, the findings show that the product was feasible (expert validation mean 90.67%), well accepted by both players and coaches, internally consistent at an early development stage (Cronbach's alpha = 0.641), and practically effective in improving team goal-difference outcomes after applying the application's recommendations (mean N-Gain = 0.62; 62.22%). These results support the study's purpose of producing a coach-friendly, data-driven tool that operationalizes position-specific indicators into an actionable recommendation format.

High feasibility ratings from the three validators indicate that the instrument content, scoring structure, and application workflow were considered appropriate for U16 SSB implementation. Importantly, the recommended revisions primarily strengthened transparency and usability—such as clarifying test sources, standardizing the scoring interpretation, and enabling outputs to be saved/printed—rather than requiring fundamental redesign. These refinements directly address common implementation barriers in real youth settings, where coaches prefer tools that are clear, efficient, and easily documented for communication with players and stakeholders.

Acceptance results were consistently positive in both trials, suggesting that the instrument was not perceived as overly burdensome or disruptive to typical training routines. This is meaningful because coaching decisions in dynamic sport environments commonly combine experience-based judgement with situational constraints; when standardized tools are absent, intuitive decision-making tends to dominate selection and positioning practices (Collins et al., 2016). The application's design—especially the guidance menu and the position-check module that produces up to three recommendations—appears to match coaches' need for simple, actionable outputs while still maintaining a structured input process.

The internal consistency estimate (Cronbach's alpha = 0.641) is acceptable for early-stage development, particularly because the 18 indicators intentionally cover multiple domains (technical and physical attributes) rather than a single trait. In early or exploratory instrument development, reliability levels around 0.60 are often considered acceptable depending on purpose and construct breadth, with the expectation that reliability improves through refinement and larger-sample testing (Ursachi et al., 2015).

In the small-scale trial, several items met the item–total correlation criterion, while others did not reach the threshold. This pattern is plausible in small samples because item–total correlations are sensitive to limited sample size, restricted score ranges, and measurement noise (e.g., scorer variability and field conditions). Therefore, retaining theoretically essential indicators that reflect position-specific demands—while clearly labeling them as targets for refinement and re-testing—was a defensible decision at this development stage, especially when supported by expert judgement and field practicality.

Effectiveness testing showed a moderate mean N-Gain and an "effective" mean percentage, indicating improved team goal-difference outcomes after implementing position recommendations. The N-Gain approach is commonly used to express normalized improvement from pre- to post-measures while accounting for starting level; accordingly, your use of N-Gain supports a transparent interpretation of improvement magnitude (Hake, 1998). However, because goal difference is a team-level outcome influenced by many factors (opponent strength, tactics, match context), the observed improvement should be interpreted as evidence of practical promise rather than definitive proof that position assignment alone caused the outcome. Future studies can strengthen causal inference by adding controls (e.g., comparable opposition, repeated matches, or randomized assignment) and by including individual-level performance indicators (e.g., successful actions per position, physical outputs, and technical effectiveness) alongside team outcomes.

Limitations of the Study

This study has several limitations typical of early-stage R&D work. First, psychometric evidence was based on a small sample for item analysis; larger multi-site samples are needed to confirm item discrimination and test structure. Second, acceptance measures were self-reported and may be influenced by novelty effects. Third, effectiveness was evaluated using team goal difference, which is valuable but not fully attributable to position assignment. Future research should: (1) expand samples across regions and SSB levels, (2) re-test and refine items that showed low discrimination, (3) evaluate inter-rater reliability for scoring consistency, and (4) develop mobile/offline versions with embedded instructional videos to standardize testing implementation.

5. Conclusion

This study developed a web-based decision-support application ("Purnama Get Position") and an 18-item, position-specific skill-testing battery for U16 SSB players. Expert validation indicated high feasibility, users reported strong acceptance, and the instrument demonstrated acceptable early-stage internal consistency. Effectiveness testing showed a moderate N-Gain, suggesting that applying the app-based position recommendations can improve team goal-difference outcomes. Further research should involve larger multi-site samples, stronger psychometric testing, and development of offline/mobile versions with embedded instructional support.

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7. Acknowledgements (Optional)

The authors would like to thank the U16 SSB players and coaches in Semarang City who participated in the small- and large-scale trials. We also express our gratitude to the expert validators (football academic expert, licensed coaching practitioner, and media/IT expert) for their time, constructive feedback, and recommendations that strengthened the instrument and the "Purnama Get Position" web application.

8. Author Declaration

The authors declare that this is original work and no conflicts of interest.