



Developing a Traditional Wela Maka Game-Based Throwing Skills Assessment Instrument for Elementary School Students

Yanuarius Ricardus Natal *

STKIP Citra Bakti,
INDONESIA

Bernabas Wani

STKIP Citra Bakti,
INDONESIA

Fulgensius Elpianus Kira

STKIP Citra Bakti,
INDONESIA

Article Info	Abstract
Article history: Received: Apr 22, 2026 Revised: Aug 27, 2026 Accepted: Sept 12, 2026 Keywords: Instrument Skills; Physical Education; Throwing Skills; Traditional Games; Wela Maka	Fundamental movement skills are central to elementary school physical education, yet throwing assessments often emphasize outcomes while giving limited attention to movement processes and culturally familiar activity contexts. This study developed a throwing-skill assessment instrument integrated with the traditional Wela Maka game for elementary school students. A Research and Development (R&D) approach adapted from the Borg and Gall model included product analysis, literature and field study, development planning, internal design testing, expert validation, revision, limited-scale testing, main field testing, and final refinement. Data were collected through observation, interviews, expert-validation questionnaires, and the developed assessment sheets and analyzed descriptively using percentages and qualitative feedback. Expert validation averaged 90.83%, the limited-scale trial 88.12%, and the main field trial 92.68%. The findings support the instrument's feasibility and practicality for observing throwing processes and outcomes in a game-based context. The final product includes Wela Maka procedures, throwing-skill indicators, an assessment rubric, scoring guidance, and teacher instructions. Because inter-rater reliability, test-retest reliability, construct validity, and criterion validity were not comprehensively examined, the results represent developmental feasibility and usability rather than complete psychometric validation.
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INTRODUCTION

Fundamental movement skills (FMS) are a core component of children's motor development and provide a basis for participation in more complex physical activities. International evidence nevertheless shows substantial variation in children's motor competence, indicating that mastery cannot be assumed simply because children participate in school physical education (Abe et al., 2022; Bolger et al., 2021; dos Santos et al., 2022; Lawson et al., 2021; Wälti et al., 2023; Wälti et al., 2025). Recent reviews also link motor competence with physical activity, physical fitness, and broader developmental outcomes, although the strength of these associations varies across age groups and measurement approaches (Bao et al., 2024; Burton et al., 2023; Foulkes et al., 2022; Xu et al., 2024). For elementary-school settings, this makes assessment important not only for documenting performance but also for identifying movement components that may require instructional support. Accordingly, assessment needs to be feasible for teachers while remaining sufficiently sensitive to the quality of children's movement performance (Eddy et al., 2021a; Nagy et al., 2023).

Among FMS domains, object-control or manipulative skills require children to coordinate body position, visual information, and force production while interacting with an object. Throwing is particularly relevant because successful performance depends on coordinated preparation, arm action, trunk involvement, directional control, and an observable movement outcome. Contemporary assessment research shows that process-oriented and product-oriented approaches capture different aspects of motor competence, so a single performance score may not fully represent how a child executes a skill (Duncan et al., 2022; Hulteen et al., 2023; Pienaar et al., 2022). Instruments that combine observable movement criteria with practical scoring procedures can therefore provide

* Corresponding author:

Yanuarius Ricardus Natal, STKIP Citra Bakti, INDONESIA. ✉ yanuariusrichardus@gmail.com

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more instructional information than outcome-only testing. This need is especially relevant in school contexts where assessment must be understandable, time-efficient, and usable by practitioners with differing levels of assessment experience (Garbeloto et al., 2024; Simpson et al., 2025).

The challenge is that many established motor assessments were designed for standardized testing rather than routine classroom use. Reviews of FMS instruments have identified substantial differences in administration time, equipment requirements, scoring models, and psychometric evidence (Radanović et al., 2021; Van Dokkum et al., 2022; Nagy et al., 2023). School-based studies have consequently emphasized the need for tools that balance measurement quality with practical implementation constraints (Eddy et al., 2021a, 2021b; Gavigan et al., 2022; O'Brien et al., 2023). Recent validation work with teacher-oriented and rapid assessment approaches further indicates that feasibility alone is insufficient; scoring consistency and evidence for validity remain necessary if results are to support educational decisions (Garbeloto et al., 2024; Bretz et al., 2024; Simpson et al., 2025). Thus, a contextually appropriate instrument should make the movement criteria observable without implying stronger psychometric properties than have actually been tested.

A second issue concerns the context in which children are assessed. Game-based and active-play approaches can provide meaningful opportunities for children to perform fundamental skills in settings that are closer to normal participation than isolated testing tasks (Hussain & Cheong, 2022; Cheong & Hussain, 2024; Zhang et al., 2025). Evidence from school and early-childhood interventions also suggests that structured physical-activity programs can improve motor competence when practice opportunities are developmentally appropriate (Khodaverdi et al., 2022; Moon et al., 2024; Zhang et al., 2024). Traditional games are particularly relevant because they combine motor demands with familiar rules, social interaction, and local cultural content. Studies using traditional games have reported improvements in gross or fundamental movement skills, including throwing-related actions, although intervention designs and measurement approaches vary (Cheong & Hussain, 2024; Fitri et al., 2024; Hussain & Cheong, 2022). These findings support examining traditional games not only as instructional activities but also as contexts in which observable motor performance can be assessed.

Recent instrument-development studies provide several methodological lessons for the present work. FUNMOVES was developed for school-based FMS screening using Rasch analysis and iterative refinement, illustrating the value of aligning tasks with school feasibility while testing measurement structure (Eddy et al., 2021b). Other contemporary tools have examined inter-rater agreement, content validity, test-retest reliability, or construct validity to determine whether scores can be interpreted consistently across assessors and occasions (Bretz et al., 2024; Chen et al., 2022; Fernández Amat et al., 2024; Garbeloto et al., 2024; Gavigan et al., 2022; O'Brien et al., 2023). At the same time, research comparing process- and product-oriented assessments indicates that different scoring approaches should not be treated as interchangeable (Hulteen et al., 2023; Pienaar et al., 2022). Recent work also continues to highlight standardization challenges in movement-skill scoring, particularly when assessor judgment is involved (Ng et al., 2025). Consequently, a newly developed culturally based instrument requires a clear distinction between evidence of feasibility and evidence of psychometric validity.

Within this literature, a specific gap remains in the use of the traditional Wela Maka game as an assessment context for throwing skills in elementary-school physical education. Existing studies have developed general FMS measures, screening tools, or sport-specific assessments, while research on traditional games has more often examined learning outcomes than the construction of a dedicated assessment instrument. The present study therefore addresses a contextual and methodological gap by linking observable throwing indicators with the procedures of Wela Maka. This focus is narrower than developing a universal FMS test; it is intended to produce a context-specific tool for observing throwing performance during a culturally based activity. The distinction is important because the value of the instrument at this stage depends on the developmental evidence collected in this study rather than on untested claims of general validity or reliability.

Accordingly, this study aimed to develop a throwing-skill assessment instrument integrated with the traditional Wela Maka game for elementary-school students and to examine its feasibility and practicality through expert review and staged field testing. The intended practical contribution is a structured rubric that can help physical education teachers observe both movement processes and performance outcomes during Wela Maka activities. Conceptually, the study contributes to

current discussion on culturally contextualized motor assessment by showing how a local game can be translated into explicit assessment indicators without removing the activity from its cultural setting. The study does not claim complete psychometric validation; rather, it provides an initial developmental basis for subsequent research on reliability, construct validity, criterion validity, and use across different student populations.

METHOD

Research Design

This study used a Research and Development (R&D) approach adapted from the Borg and Gall development model because the research objective was to produce and iteratively refine a throwing-skill assessment instrument integrated with the traditional Wela Maka game. The development process comprised nine operational stages: analysis of existing products; literature review and field study; product-development planning; internal design testing; expert validation; revision of the initial design; limited-scale field testing; first product revision; and large-scale field testing followed by a second revision to obtain the final product. The stages were used to align the instrument with elementary-school physical education, the observable characteristics of throwing performance, and the procedures of the Wela Maka game.

Research Context and Participants

The study involved expert validators and elementary-school students who participated in the product-testing stages. The validators represented physical education, educational evaluation, and traditional games and reviewed content suitability, instrument construction, language, and compatibility with Wela Maka. Limited-scale testing involved a smaller group of students, followed by a main field trial with a larger group.

Instrument Development and Data Collection

Data were collected through observation, interviews, expert-validation questionnaires, and the throwing-skill assessment sheets developed in this study. The assessment framework covered movement preparation, throwing execution, body coordination, directional accuracy, and movement outcomes during Wela Maka activities. The developed product included game implementation procedures, observable throwing indicators, assessment rubrics, scoring guidance, and teacher instructions. Expert comments and user feedback were used to revise wording, movement indicators, score descriptions, procedures, and layout across the development stages.

Data Analysis and Scope of Validation

Evidence collected in this study primarily addressed expert-assessed feasibility and user-oriented practicality. Qualitative feedback from validators and users was analyzed through reduction, interpretation, and conclusion drawing and was used to guide product revision. Quantitative validation and trial responses were summarized as percentages and interpreted using the feasibility categories reported in the Results section. Inter-rater reliability, test-retest reliability, construct validity, and criterion validity were not comprehensively examined; therefore, the reported percentages should be interpreted as developmental evidence of feasibility and practicality rather than complete psychometric validation.

Development Procedure

The development procedure moved from needs-oriented analysis to iterative design, expert review, field testing, and revision. Existing assessment products and relevant literature were first examined to identify the need for a process-sensitive throwing assessment. The initial instrument was then designed around Wela Maka procedures and throwing indicators, reviewed internally, and submitted to expert validation. Feedback informed the first design revision before limited-scale implementation, after which usability findings were used for another revision. The revised product was subsequently implemented in the main field trial, and the final version was prepared after the second revision. Figure 2 summarizes the development sequence.

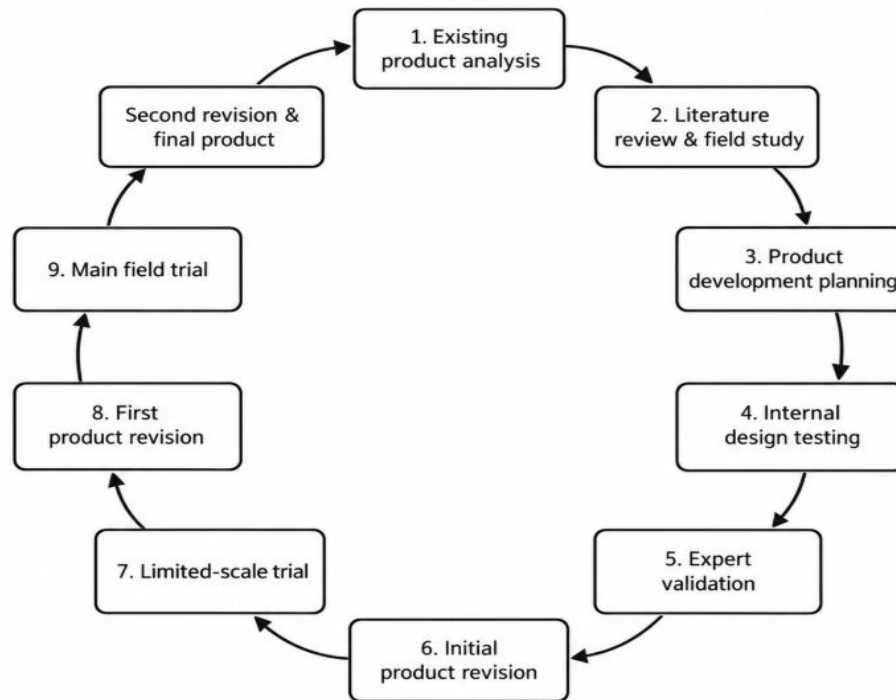


Figure 2. Research and development procedure for the Wela Maka-based throwing-skill assessment instrument.

RESULTS AND DISCUSSION

Results

Product Development Results

This study produced a throwing skill assessment instrument integrated with the traditional game Wela Maka for elementary school students. The product was developed through the Research and Development (R&D) process by adapting the Borg and Gall model into nine development stages. Each stage was designed to ensure that the resulting instrument was appropriate for elementary school students, aligned with physical education learning principles, and capable of assessing manipulative skills, particularly throwing ability.

The final product consisted of the Wela Maka game implementation procedures, throwing skill observation indicators, assessment rubrics, scoring guidelines, and a user manual for teachers.

Existing Product Analysis

The first stage involved analyzing existing movement skill assessment instruments commonly used in elementary school physical education. The findings revealed that most available instruments focused on general motor abilities and did not specifically integrate throwing skills within traditional game activities. In addition, the majority of the instruments emphasized movement outcomes rather than movement processes, such as body positioning, movement coordination, and throwing techniques.

Literature Review and Field Study

The second stage consisted of a literature review and field study. The literature review indicated that throwing is a manipulative skill that should be developed through engaging learning activities appropriate to children's developmental characteristics. The field study, conducted through observations of physical education classes, revealed the need for an instrument that could assist teachers in assessing throwing skills more systematically.

Based on these findings, the traditional game Wela Maka was selected because it incorporates object-targeting activities, body coordination, and throwing accuracy, making it suitable for assessing students' throwing skills.

Product Development Planning

The third stage involved designing the initial version of the throwing skill assessment instrument based on the traditional game Wela Maka. The main components included game implementation guidelines, throwing skill indicators, movement assessment criteria, scoring rubrics, and instrument administration procedures. The design was developed by ensuring consistency between game activities and manipulative skill indicators relevant to elementary school students. The product design was developed by considering the suitability of game activities with indicators of elementary school students' manipulative skills. The initial product development plan can be seen in Figure 1.

A. IDENTITAS INSTRUMEN		B. DESKRIPSI PERMAINAN WELA MAK		C. TUJUAN PENGUKURAN	
Nama Instrumen	: Instrumen Keterampilan Melempar Terintegrasi Permainan Tradisional Wela Maka	Wela Maka adalah permainan tradisional yang dimainkan oleh dua kelompok. Setiap kelompok berusaha melemparkan bola (objek lempar) ke arah sasaran atau area lawan dengan cara bergiliran. Kelompok yang mampu mengenai sasaran atau pemain lawan mendapatkan poin. Permainan ini menekankan keterampilan melempar yang tepat, terarah, dan terkontrol.		1. Mengukur kualitas proses keterampilan melempar siswa saat melakukan permainan Wela Maka. 2. Memberikan informasi perkembangan keterampilan melempar siswa secara objektif dan sistematis. 3. Membantu guru dalam merancang tindak lanjut pembelajaran.	
Sasaran	: Siswa Sekolah Dasar (Kelas IV–VI)	Karakteristik Permainan : • Dimainkan oleh dua kelompok (5–7 pemain per kelompok) • Menggunakan bola kecil sebagai objek lempar • Area permainan berbentuk persegi panjang • Pemain melempar dari belakang garis batas • Poin diperoleh jika lemparan mengenai sasaran/area lawan • Permainan berlangsung secara bergiliran		D. INDIKATOR KETERAMPILAN MELEMPAR 1. Sikap awal / persiapan 2. Gerakan ayunan lengan 3. Pelepasan bola 4. Arah dan ketepatan lemparan 5. Sikap akhir (follow through) 6. Koordinasi dan keseimbangan tubuh	
Fokus Keterampilan	: Keterampilan Melempar				
Bentuk Kegiatan	: Permainan Tradisional Wela Maka				
Tujuan Instrumen	: Menilai kualitas keterampilan melempar siswa melalui aktivitas permainan tradisional Wela Maka.				

E. ASPEK PENILAIAN DAN RUBRIK		F. PROSEDUR PELAKSANAAN		G. PEDOMAN PENSKORAN											
Skor	Kriteria Umum			• Setiap aspek dinilai berdasarkan kriteria pada rubrik skor (1–4). • Skor akhir siswa adalah jumlah skor seluruh aspek. • Skor maksimum = 24 (6 aspek × 4) • Kategori hasil: <table border="1"> <thead> <tr> <th>Rentang Skor</th> <th>Kategori</th> </tr> </thead> <tbody> <tr> <td>19 – 24</td> <td>Sangat Baik</td> </tr> <tr> <td>13 – 18</td> <td>Baik</td> </tr> <tr> <td>7 – 12</td> <td>Cukup</td> </tr> <tr> <td>0 – 6</td> <td>Kurang</td> </tr> </tbody> </table>		Rentang Skor	Kategori	19 – 24	Sangat Baik	13 – 18	Baik	7 – 12	Cukup	0 – 6	Kurang
Rentang Skor	Kategori														
19 – 24	Sangat Baik														
13 – 18	Baik														
7 – 12	Cukup														
0 – 6	Kurang														
4	Sangat Baik	1. Guru menjelaskan aturan dan tujuan permainan. 2. Siswa dibagi menjadi dua kelompok dan menempati posisi awal. 3. Pemain melempar bola secara bergiliran ke arah sasaran/area lawan. 4. Kelompok memperoleh poin jika lemparan mengenai sasaran/ pemain lawan. 5. Permainan berakhir setelah waktu yang ditetapkan.													
3	Baik	Catatan: Guru memastikan keamanan, sportivitas, dan semua siswa mendapatkan kesempatan yang sama.													
2	Cukup														
1	Kurang														

H. LEMBAR OBSERVASI										
Nama Siswa : _____		Kelas : _____								
Tanggal : _____		Kelompok : _____		Observer : _____						
No.	Nama Siswa	1. Sikap Awal / Persiapan (1–4)	2. Gerakan Ayunan Lengan (1–4)	3. Pelepasan Bola (1–4)	4. Arah dan Ketepatan Lemparan (1–4)	5. Sikap Akhir (Follow Through) (1–4)	6. Koordinasi dan Keseimbangan Tubuh (1–4)	Total Skor (0–24)	Kategori	Catatan
1.										
2.										
3.										
4.										
5.										
...										

KETERANGAN	
	Sikap Awal / Persiapan Posisi tubuh siap, kaki sejajar/buka selebar bahu, pandangan fokus ke sasaran.
	Gerakan Ayunan Lengan Ayunan lengan ke belakang dan ke depan dilakukan dengan benar.
	Pelepasan Bola Bola dilepas pada titik yang tepat dengan kontrol gerakan yang baik.
	Arah dan Ketepatan Lemparan Bola mengarah ke sasaran dan mengenai target.
	Sikap Akhir (Follow Through) Gerakan lanjutan setelah melepas bola dilakukan dengan baik.
	Koordinasi dan Keseimbangan Tubuh Gerakan melempar dilakukan dengan koordinasi tubuh yang baik dan seimbang.

Figure 1 Design Overview of Integrated Throwing Skill Instrument Development for the Traditional Wela Maka Game

Internal Design Testing and Expert Validation

The fourth and fifth stages involved internal design testing and expert validation. Internal testing was conducted to review the coherence among throwing skill indicators, assessment rubrics, and game procedures before expert evaluation.

Table 1 shows an average expert-validation score of 90.83%, categorized as Highly Feasible. Within the scope of the expert-review procedure used in this study, the ratings indicate strong perceived suitability of the content, instrument construction, and alignment with the Wela Maka game. Validator feedback also identified areas requiring refinement, including simpler user-language, more observable movement indicators, and a more practical rubric format. These revisions were incorporated before the limited-scale trial. Because the study did not report a formal content-validity coefficient across multiple raters, the percentage should be interpreted as expert-assessed feasibility rather than as comprehensive evidence of psychometric validity.

Table 1. Expert Validation Results of the Throwing Skill Assessment Instrument

Validator	Assessment Aspect	Percentage (%)	Category
Physical Education Expert	Suitability of content and student characteristics	91,25	Highly Feasible
Educational Evaluation Expert	Instrument construction and assessment rubric	88,75	Highly Feasible
Traditional Game Expert	Suitability of Wela Maka game concept	92,50	Highly Feasible
Average	-	90,83	Highly Feasible

Initial Product Revision

The sixth stage involved revising the initial product design based on expert feedback. The revisions included improving the throwing skill indicators, refining score descriptions within the rubric, and simplifying game procedures to facilitate implementation in physical education learning. The revised product was then used in the limited-scale trial.

Limited-Scale Trial

The limited-scale trial produced an average score of 88.12%, categorized as Very Good. The strongest rating concerned the clarity of game procedures, while the practicality of the assessment rubric received the lowest percentage among the four assessed aspects. These results suggest that the instrument was generally understandable and usable in the tested setting, while also identifying specific aspects for revision. Observations from this stage led to the addition of movement demonstrations and simplification of instructions. Accordingly, the limited trial provides evidence of usability and practicality rather than comparative effectiveness.

Table 2. Limited-Scale Trial Results

Assessment Aspect	Percentage (%)	Category
Ease of instrument use	87,50	Very Good
Clarity of game procedures	90,00	Very Good
Suitability of observation indicators	88,75	Very Good
Practicality of assessment rubric	86,25	Very Good
Average	88,12	Very Good

First Product Revision

The eighth stage involved revising the product based on the limited-scale trial findings. Improvements included adding more detailed implementation guidelines, clarifying scoring procedures, and enhancing the instrument layout to facilitate observation during gameplay. The revised instrument was subsequently implemented in the main field trial involving a larger number of participants.

Main Field Trial

The main field trial produced an average score of 92.68%, categorized as Very Good. Ratings were high across implementation feasibility, observation of throwing skills, ease of teacher application, and suitability with game activities. Relative to the limited-scale trial, the higher average followed revisions to instructions, scoring procedures, and layout; however, the design does not establish that revision alone caused the difference between trial scores because the participant groups and testing conditions were not reported in sufficient detail for such a comparison. The findings therefore support the final product's feasibility and practicality within the study context.

Table 3. Large-Scale Trial Results

Assessment Aspect	Percentage (%)	Category
Instrument implementation feasibility	93,00	Very Good
Effectiveness in observing throwing skills	91,50	Very Good
Ease of application by teachers	92,25	Very Good
Suitability with game activities	94,00	Very Good
Average	92,68	Very Good

The principal finding is that the Wela Maka-based throwing assessment was judged highly feasible by experts and received very good ratings in both field-testing stages. These ratings suggest that the instrument components were sufficiently aligned for practical use within the developmental context examined in this study. This interpretation is consistent with current movement-assessment literature, which emphasizes that school-oriented tools must connect observable skill criteria with feasible administration procedures (Eddy et al., 2021a; Nagy et al., 2023; Simpson et al., 2025). The result is also compatible with recent instrument-development studies showing that practitioner usability is an important design consideration alongside psychometric quality (Bretz et al., 2024; Garbeloto et al., 2024). Nevertheless, high feasibility ratings should not be equated with evidence that scores are already reliable across raters or valid against external criteria. The contribution at this stage is therefore developmental: the study establishes a workable assessment format that can be subjected to stronger psychometric testing in subsequent research.

A second contribution concerns the decision to assess both movement process and movement outcome. The instrument includes preparation, execution, coordination, directional accuracy, and movement results, thereby avoiding an exclusively outcome-oriented definition of throwing competence. Research comparing FMS assessment approaches shows that process- and product-oriented measures provide related but non-identical information about movement competence (Duncan et al., 2022; Hulteen et al., 2023; Pienaar et al., 2022). This matters educationally because two students may achieve a similar target outcome while using different movement patterns, creating different instructional needs. By making movement components explicit, the Wela Maka rubric can potentially support feedback that is more specific than a distance- or accuracy-only score. At the same time, such observation increases dependence on assessor judgment, which is why future inter-rater reliability testing is essential (Garbeloto et al., 2024; Ng et al., 2025).

The integration of Wela Maka provides a culturally situated context for eliciting throwing performance. Traditional cultural games can generate repeated and purposeful movement opportunities while preserving the social and rule-based features of play (Cheong & Hussain, 2024; Hussain & Cheong, 2022). Related research has reported benefits of traditional-game or active-play approaches for gross and fundamental movement skills, although intervention effects vary by task, duration, and design (Fitri et al., 2024; Moon et al., 2024; Zhang et al., 2025). In the present study, Wela Maka was not tested against a conventional assessment as an experimental treatment, so claims that it produces superior performance would exceed the available evidence. Its demonstrated value is more specific: the game provided an authentic activity structure in which throwing indicators could be observed and scored. This contextual alignment is the main practical rationale for integrating the game into the assessment instrument.

The staged revisions also illustrate why iterative development is important in school-based assessment. Expert feedback focused on language, movement indicators, and rubric format, while limited-scale testing identified the need for demonstrations, simpler instructions, clearer scoring procedures, and a more usable layout. Similar school-based assessment research has shown that implementation demands, assessor training, and scoring clarity can affect whether a technically sound instrument is feasible in practice (Eddy et al., 2021a, 2021b; Van Dokkum et al., 2022). Recent rapid-assessment work likewise indicates that practicality must be evaluated together with evidence concerning what the scores represent (Simpson et al., 2025). In this study, the iterative cycle allowed problems identified at one stage to inform the next version of the product. The resulting increases in field-test percentages are encouraging and are best interpreted as descriptive evidence of feasibility across successive development stages.

The final rubric may also have practical value for physical education teachers because the assessed components translate a broad skill label, throwing, into observable criteria. Teacher-oriented FMS studies have repeatedly identified the tension between the usefulness of motor assessment and the time, knowledge, and workload required to conduct it (Eddy et al., 2021a; Nagy et al., 2023). This issue has motivated recent efforts to develop school-based tools that are quicker to administer and easier to interpret (Eddy et al., 2021b; Garbeloto et al., 2024; Simpson et al., 2025). The present instrument follows the same practical direction but differs by embedding observation within a specific traditional game. Such contextualization may make the assessment more meaningful for local instruction, although teacher training remains necessary to reduce variation in scoring. The user manual and scoring descriptions should therefore be viewed as essential parts of the instrument rather than supplementary materials.

The study's results should also be positioned cautiously within the broader motor-competence literature. International evidence indicates that children's motor competence varies considerably across populations and is associated with physical activity, fitness, and developmental outcomes (Bao et al., 2024; Bolger et al., 2021; Burton et al., 2023; Xu et al., 2024). However, these broader associations do not establish that the Wela Maka instrument predicts health, participation, or learning outcomes. Nor can the current results establish equivalence with standardized FMS measures such as TGMD-based assessments. Recent validity studies show that even promising school-based tools require direct evidence of score consistency and construct or concurrent validity before broad interpretation is justified (Chen et al., 2022; Garbeloto et al., 2024; Simpson et al., 2025). The present findings therefore occupy an earlier point in the validation process and should be used primarily to guide refinement and future testing.

Taken together, the novelty of this study lies in operationalizing a local traditional game as a structured context for throwing-skill assessment rather than treating the game only as a learning intervention. The resulting instrument links culturally situated activity procedures with explicit movement indicators, a scoring rubric, and teacher guidance. This contribution complements the global movement-assessment literature, which increasingly calls for tools that are both methodologically defensible and feasible in real educational settings (Eddy et al., 2021b; Nagy et al., 2023; Garbeloto et al., 2024). The next step is not to expand the claims of the current percentages, but to test whether different assessors produce comparable scores, whether scores remain stable when appropriate, and whether they correspond with established measures of throwing or object-control competence. Evidence from such studies would determine whether the instrument can progress from a feasible developmental product to a psychometrically supported assessment tool.

Limitation

This study developed a throwing-skill assessment instrument integrated with the traditional Wela Maka game using a modified Borg and Gall R&D process. Expert review yielded an average feasibility score of 90.83%, while limited-scale and main field trials yielded 88.12% and 92.68%, respectively. Within the tested context, these findings indicate that the instrument was perceived as feasible, understandable, and practical for observing throwing performance during Wela Maka activities. The final product includes game procedures, observable throwing indicators, an assessment rubric, scoring guidance, and teacher instructions, allowing movement processes and outcomes to be considered within the same assessment context.

The study's contribution is primarily developmental and contextual rather than a claim of complete psychometric validation. By translating a local traditional game into explicit assessment criteria, the instrument provides a culturally situated framework for physical education assessment while retaining the structure of Wela Maka. Its broader interpretation remains limited because inter-rater reliability, test-retest reliability, construct validity, and criterion validity were not comprehensively examined, and the instrument was not compared directly with an established throwing or fundamental movement skill assessment.

Future research should test the instrument with larger and more diverse samples and examine inter-rater reliability, test-retest reliability, construct validity, and criterion validity. Direct comparison with established fundamental movement skill or throwing assessments would help determine convergent or criterion-related evidence, while studies across different schools and cultural settings could clarify the instrument's broader applicability. Subsequent development may also examine whether the same game-based assessment principle can be extended to other fundamental movement skills.

CONCLUSION

This study developed a throwing-skill assessment instrument integrated with the traditional Wela Maka game for elementary school students using a modified Borg and Gall Research and Development approach. Expert validation yielded an average feasibility score of 90.83%, while the limited-scale and main field trials yielded 88.12% and 92.68%, respectively. Within the context examined, these results support the feasibility and practicality of using Wela Maka as a structured setting for observing both throwing processes and performance outcomes. The final product includes game implementation procedures, throwing-skill indicators, an assessment rubric, scoring guidance, and teacher instructions. Because comprehensive psychometric testing was not conducted, the instrument should be interpreted as a promising developmental assessment product rather than as a fully validated standardized measure. Its main contribution is the integration of culturally situated game activity with explicit throwing-assessment criteria for elementary-school physical education.

AUTHOR CONTRIBUTIONS

YRN contributed to Conceptualization, methodology, investigation, instrument design, data curation, formal analysis, validation, writing-original draft preparation, and project administration. BW contributed to methodology, supervision, validation, review of the instrument development process, writing-review and editing, and interpretation of the findings. FEK contributed to investigation, field testing, data collection, visualization, validation, writing-review and editing, and

final manuscript approval. All authors contributed to the development of the throwing skill assessment instrument integrated with the traditional Wela Maka game, discussed the results, reviewed the manuscript critically, and approved the final version for publication.

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