



Psychometric properties of a questionnaire for evaluating curriculum development needs in Chinese martial arts short-weapon Physical Education

Propiedades psicométricas de un cuestionario para evaluar las necesidades de desarrollo curricular en la Educación Física de armas cortas de las artes marciales chinas

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Abstract

Introduction and objective. The integration of Chinese martial arts into primary school physical education has increased following recent curriculum reforms; however, systematic tools to assess curriculum development needs, particularly for short weapon martial arts, remain limited. The objective of this study was to develop and validate a questionnaire to assess the curriculum development needs of primary school physical education teachers for Chinese martial arts short weapon instruction.

Methodology. The questionnaire was developed based on shulman's four domains of teacher knowledge: cognition, personal development, pedagogy, and student information. Six experts in physical education, curriculum studies, and martial arts using the content validity index evaluated face validity and content validity. Data were collected from 161 primary school physical education teachers. Sampling adequacy was assessed using the kaiser-meyer-olkin test and Bartlett's Test of Sphericity, and internal consistency was examined using cronbach's alpha. **Results:** Expert evaluation indicated high content relevance, with a scale-level content validity index value of 0.97. The kaiser-meyer-olkin value was 0.959, and Bartlett's test of sphericity was statistically significant, confirming the suitability of the data. The questionnaire demonstrated very high internal consistency, with a cronbach's alpha coefficient of 0.980.

Conclusions: The questionnaire shows excellent validity and reliability for assessing curriculum development needs related to Chinese martial arts short weapon instruction in primary schools. It provides a reliable basis for curriculum design, teacher training, and future research in martial arts physical education.

Keywords

Martial arts short weapon curriculum; needs assessment; questionnaire development; reliability; validity.

Resumen

Introducción y objetivo: la incorporación de las artes marciales chinas en la educación física de primaria ha aumentado tras las recientes reformas curriculares; sin embargo, existen pocos instrumentos sistemáticos para evaluar las necesidades de desarrollo curricular, especialmente en la disciplina de armas cortas. El objetivo de este estudio fue desarrollar y validar un cuestionario para evaluar las necesidades de desarrollo curricular de profesores de educación física de primaria en artes marciales chinas de armas cortas.

Metodología: el cuestionario se diseñó a partir de las cuatro categorías de conocimiento docente propuestas por shulman: cognición, desarrollo personal, pedagogía e información del estudiante. La validez facial y de contenido fue evaluada por seis expertos en educación física, currículo y artes marciales mediante el índice de validez de contenido. Los datos se recogieron de 161 profesores de educación física de primaria. La idoneidad de los datos se evaluó mediante la prueba kaiser-meyer-olkin y la prueba de esfericidad de bartlett, y la fiabilidad se determinó mediante el coeficiente alfa de cronbach.

Resultados: la evaluación de expertos mostró una alta relevancia de los ítems, con un valor de índice de validez de contenido a nivel de escala de 0,97. El valor kaiser-meyer-olkin fue de 0,959 y la prueba de bartlett resultó estadísticamente significativa, confirmando la adecuación de los datos. El cuestionario presentó una consistencia interna muy alta, con un coeficiente alfa de cronbach de 0,980.

Conclusiones: el cuestionario desarrollado presenta una validez y fiabilidad excelentes para evaluar las necesidades de desarrollo curricular relacionadas con la enseñanza de artes marciales chinas de armas cortas en la educación primaria. Este instrumento proporciona una base sólida para el diseño curricular, la formación docente y futuras investigaciones en educación física y artes marciales.

Palabras clave

Artes marciales de arma corta; desarrollo de cuestionarios; evaluación de necesidades; fiabilidad; validez.



Introduction

In recent years, the field of primary education in China has been deepening educational reforms, particularly in physical education. With the release of the "Physical Education and Health Curriculum Standards (2022 Edition)," both the connotations and extensions of physical education have undergone profound changes. The standards explicitly propose strengthening students' physical fitness and social adaptability, focusing on the development of students' comprehensive abilities, and particularly emphasize the important role of martial arts education in physical education. As a result, many educational departments have incorporated martial arts into school physical education curricula and have been continuously exploring and practicing its implementation (Sam et al., 2013).

However, in practice, primary school physical education teachers face many challenges in teaching martial arts. Firstly, the overall quality of the martial arts teaching staff is inadequate, as many primary school physical education teachers have not received systematic martial arts training, leading to significant gaps in teaching philosophy and methodology. Secondly, there is a lack of teaching resources, particularly for the specialized "Short Weapon" martial arts program, with weak support in terms of curriculum design and teaching materials (Sun, 2021). Moreover, teachers lack effective assessment tools and methods during the teaching process, making it difficult to accurately evaluate students' learning progress and developmental needs. These issues not only affect teaching effectiveness but also hinder the cultivation of students' interest in martial arts and the enhancement of their athletic abilities.

"Short Weapon" martial arts, as a fundamental category of martial arts, is characterized by its simple movements, ease of learning, and moderate physical requirements, making it an ideal martial arts program for primary school students (H. Li & Li, 2012). The implementation of this curriculum not only enhances students' physical fitness and teamwork abilities, but also helps cultivate a sense of cultural identity and national pride. However, despite the considerable promotional potential of "Short Weapon" martial arts, existing research has primarily focused on the theoretical exploration and promotion of traditional martial arts, with a lack of specific needs assessments for the "Short Weapon" curriculum, particularly regarding the actual needs of primary school students and the effectiveness of instruction.

Prevailing research predominantly emphasizes pedagogical strategies and curriculum frameworks, while systematic evaluations of instructional needs remain scarce. This analytical gap constrains educators' capacity to tailor teaching methodologies effectively. Therefore, there is a need to develop a more effective needs assessment tool that has psychometric and construct validity so as to enable meaningful change in the curricular transformation of "Short Weapon" martial arts instruction.

Although there has been an increase of policy support of martial arts learning in China, there are only a few systemic empirical tools to assess curriculum development requirements of teachers, particularly relating to short-weapon martial arts. The assessment of practical needs of teachers by means of psychometrically reliable instruments has been largely neglected in current literature despite the fact that the advocacy of philosophical claims or the use of the instructional methods is predominantly discussed. The methodological gap of this oversight is seen within the academic rubric of the subject of international Physical Education wherein curriculum changes require dependable and valid needs-assessment tools to inform evidence-based development and educator training.

The current study is therefore aimed at creating and testing a questionnaire that will help to evaluate the curriculum development requirements of the physical-education teachers working in primary-schools and teaching content based on martial arts in short weapons taught in Chinese. Through the use of globally accepted psychometric standards, the study provides a culturally sensitive with methodologic transferability of the tool that can be used to inform curriculum design, educator professional learning, and future comparative research studies in martial-arts training.

This study will address the following two core questions:

- a. Does the "Short Weapon" martial arts curriculum needs assessment questionnaire developed in this study possess good validity and reliability, and effectively reflect the teaching needs of primary school physical education teachers?
- b. Do the validity and reliability validation results of the questionnaire provide scientific evidence for the teaching of "Short Weapon" martial arts curriculums by primary school physical education teachers?



Literature Review

"Short Weapon" Martial Arts curriculum

Short weapon sports, as an integral component of Chinese martial arts, carry rich historical and cultural connotations. Originating from ancient cold weapons like swords and knives, short weapon sports have been reformed using modern sports techniques, making them better suited to contemporary school culture's needs and promotion. In ancient times, short weapons were crucial tools for soldiers and warriors in close combat. Over time, short weapons gradually evolved into a martial arts discipline, deeply integrating the essence of traditional Chinese culture. Through the systematic development of teaching materials, short weapon sports not only help students acquire martial arts skills but also deepen their understanding of traditional Chinese culture and spirit.

Short weapon sports demand both technical precision and tactical intelligence while simultaneously enhancing students' physical fitness and psychological resilience. Training in these disciplines improves motor coordination, cognitive focus, and emotional regulation, fostering overall athletic and mental development. Additionally, the dynamic nature of short weapon combat stimulates students' interest in sports, promoting long-term engagement in physical activity (Xu et al., 2021). Aiming to be one of the core components of China's martial arts culture, short weapon sports has enjoyed widespread public support by organizing national competitions and improving regulations. However, although there are some progress in this area, many schools still lack both knowledge and curriculum integration. Short weapon sports go beyond just being an athletic activity; it is the embodiment of the spirit of the Chinese people and represents the continuous inheritance of the country's traditional values when integrated into schools and education (Dongdong, 2025)

As an individualized sport, short weapons sports have both significant history and culture as well as being the cornerstone of modern education. Through their practice, students instill a sense of national pride and cultural identity along with maintaining tradition by promoting the study of old martial arts. Beyond cultural value, short weapon training improves physical fitness and cultivates psychological resilience. Its combative nature demands strong mental fortitude, discipline, and adaptability, helping students build confidence, courage, and the ability to handle pressure effectively (Vertonghen & Theeboom, 2010). In addition, short weapon sports can foster students' sense of teamwork and competitive spirit. During training, students learn to collaborate with teammates, face challenges, and cultivate a sense of collective honor and responsibility (Xu et al., 2021).

Short weapon sports not only contribute to the learning of martial arts skills but also play a role in preserving and transmitting traditional Chinese culture. Through the development of specialized teaching materials, short weapon sports integrate traditional martial arts with modern education, allowing students to master martial arts skills while gaining a deeper understanding of traditional Chinese culture and spirit. As a representative of traditional Chinese culture, the promotion of short weapon sports helps enhance students' cultural confidence and national identity (C. Wang & Liu, 2017)

Moreover, short weapon sports enrich the campus sports culture and promote the holistic development of students. As a sports activity that combines ethnic identity, fitness, and entertainment, short weapon sports align with the needs of school sports education and contribute to the comprehensive development of students in moral, intellectual, physical, aesthetic, and labor aspects. The promotion of short weapon sports can stimulate students' interest in physical activities, enhance their physical fitness and overall competence, thereby driving the comprehensive reform and development of education (Cui & Lei, 2020).

Needs Assessment

Needs assessment is a crucial component in educational research, especially in the processes of curriculum design and teaching improvement. The purpose of needs assessment is to identify the deficiencies of the target group in areas such as knowledge, skills, and attitudes, providing data support for the development of effective educational programs (Mccawley 2009). In the development of the martial arts "short weapon" curriculum, needs assessment helps clarify the actual demands faced by primary school



physical education teachers in their teaching processes, providing scientific evidence for the design of curriculum content and teaching methods.

Needs assessment is not only aimed at meeting learning needs but also at considering the overall goals of the educational system and its implementation context. In medical education, needs assessment has become a part of government policy, ensuring the continuous improvement of healthcare professionals' expertise through professional development programs (Grant 2002). Kaufman (1979) suggested that needs assessment serves as a bridge between educational needs, curriculum goals, and management objectives, ensuring that the formulation and implementation of these goals are based on real needs. In his model, needs assessment helps educators prioritize curriculum design and allocate resources by collecting data (Kaufman et al. 1979).

Barbazette (2006) further emphasized the importance of needs assessment in corporate training. It helps organizations identify specific training needs of employees, thereby enhancing the effectiveness of training (Barbazette 2006). This approach is equally applicable in education, where needs assessment can reveal deficiencies in existing curricula and provide a basis for curriculum innovation. Through scientific needs assessment, educators can design educational programs that better align with actual needs. The conceptual framework of the needs assessment process in the "short weapon" curriculum is illustrated in Figure 1.

Figure 1. Needs Assessment



Alt Text:

"A circular flow diagram labeled 'Needs Assessment' illustrates five sequential stages. Step 1, in green, reads 'Gather evidence.' Step 2, in blue, reads 'Analyze evidence.' Step 3, in purple, reads 'Brainstorm contributing factors.' Step 4, in orange, reads 'Get to a root cause.' Step 5, in red, reads 'Determine next steps for improvement.' Arrows connect each step in a continuous loop."

With the development of educational technology, the application of needs assessment in technology integration has become particularly important. O'Reilly (2016) suggests that needs assessment helps to understand the specific needs of teachers and students in the use of technology, providing a basis for the integration of educational technology (O'reilly 2016).

The role of needs assessment is particularly prominent among elementary school physical education teachers. By conducting needs assessment among physical education teachers, the specific needs and challenges they face in teaching "short weapon" martial arts can be revealed, helping to design curriculums that are more aligned with their teaching needs. Mustafa et al. (2015) highlighted that needs assessment helps educators accurately identify teachers' technological needs, enabling targeted training to boost their confidence and teaching effectiveness.(Mustafa et al. 2015). Koc (2010) emphasized that needs assessment is vital in teacher education, especially for technology integration, ensuring effective use of new teaching tools.(Koc et al. 2010).

Validity



In educational research, questionnaire validity is key to ensuring accurate reflection of the studied content.(Muijs 2010). Validity usually includes multiple dimensions, such as content validity, face validity, construct validity, and criterion validity.(Jackson 2009). Content validity assesses whether a questionnaire comprehensively covers all relevant aspects of the research area, typically verified through expert review. Face validity evaluates whether the questionnaire appears to measure the intended content, relying on the target group's intuitive judgment.(Connell et al. 2018). Construct validity examines whether the questionnaire accurately measures complex constructs, such as multidimensional teaching needs in "Short Weapon" curriculum development. Criterion validity assesses the consistency between questionnaire results and external standards, often verified through correlation analysis. To enhance validity, researchers refine questionnaire design through expert reviews, pilot studies, and item analysis.(Muijs 2010).The validity assessment of the questionnaire is crucial to ensure that the "short weapon" curriculum needs assessment questionnaires accurately and comprehensively reflect the actual needs of elementary school physical education teachers.

Reliability

Reliability of a questionnaire refers to the extent to which it yields consistent results over time or across different raters, ensuring the stability and reproducibility of research data. Common methods for assessing reliability include internal consistency, test-retest reliability, and inter-rater reliability. Internal consistency refers to the extent to which items in a questionnaire consistently measure the same construct. The most commonly used statistical method is Cronbach's α coefficient, with a value typically required to be above 0.7 to ensure good internal consistency of the questionnaire's content (Nunnally 1978). Test-retest reliability evaluates the consistency of results when the same questionnaire is administered at different time points, ensuring the stability of measurement for the same characteristics (Carmines 1979). Inter-rater reliability examines whether different raters provide consistent ratings for the same questionnaire, which is especially important for open-ended questions or questionnaires assessed by multiple raters (Fleiss 1971). Cronbach's α coefficient, as the most widely used method for testing internal consistency, is extensively applied in questionnaire design within the educational field. When a questionnaire includes multiple dimensions, researchers can calculate the α coefficient for each dimension to verify its reliability (Zio 2009). Additionally, some researchers have proposed reliability assessment methods based on stratified analysis and machine learning techniques to enhance the precision of reliability evaluations. In this study, evaluating the reliability of the questionnaire ensures the stability and consistency of the Wushu "Short Weapon" curriculum needs assessment, thereby enhancing the scientific rigor and credibility of the research findings.

International Questionnaire Development and PE Curriculum Research

To enhance the relevance of this study, recent research on questionnaire development and physical education curricula was reviewed. Cocca developed and validated a questionnaire assessing physical education teachers' professional competence, establishing a robust four-factor structure with satisfactory internal consistency through EFA and CFA (Cocca et al. 2023). Their approach provides a methodological reference for psychometrically grounded instrument design.

In a similar vein, Sepahvand constructed an instrument evaluating PE teachers' competencies in fitness monitoring to promote physical literacy, emphasizing the role of technology-integrated skills and assessment capacity (Sepahvand et al. 2025). Brown confirmed the structural validity of tools measuring PE teachers' beliefs and self-efficacy, supporting the adoption of multidimensional validation frameworks (Brown 2023).

In the field of martial arts education, Stamenković conducted a systematic review of empirical studies on children's participation in taekwondo, karate, and judo programs, revealing consistent improvements in physical fitness, discipline, and self-regulation (Stamenković et al. 2022). Additionally, Lakes evaluated a school-based taekwondo program, reporting significant effects on executive function and BMI, thereby supporting the pedagogical and health-promoting value of martial arts integration (Lakes et al. 2013).



Research Methodology

In this study, face validity is verified through experts' evaluation, whereas pilot surveys are used to establish content validity. The results of the face validity and content validity tests confirm that the needs assessment questionnaire fits well its purpose as it was designed based on "Short Weapon" curriculum needs analysis. The content validity test focuses on assessing the fit of questionnaire dimensions with measurement objective; thus, it is coherent with theory. The Kaiser–Meyer–Olkin test and Bartlett's test of sphericity are performed in order to check whether the data obtained from the questionnaire has proper distribution for factor analysis. A KMO value larger than 0.6 and statistically significant Bartlett's test suggest that the data is suitable for factor analysis. Finally, we conducted an internal consistency test by measuring Cronbach's α coefficient.

Face Validity

Face validity was further determined by asking a panel of six experts in fields related to physical education, curriculum development, and martial arts teaching to examine if items in the proposed needs assessment questionnaire described what the curriculum was really intended to teach, based on their evaluation. A preliminary version of a proposed "Short Weapon" curriculum needs assessment questionnaire was prepared and distributed with the questionnaire items and research context to six experts who could evaluate it critically. Based on expert comments, the items were refined and optimized, respectively. After a second revision, the questionnaire was found to be acceptable and was considered as being face valid.

Content Validity

Furthermore, to determine whether the content of the collected data was valid, we used the Content Validity Index (CVI) to measure the extent to which expert opinion on the adequacy of the questionnaire was needed. The evaluation process included a rigorous expert review to verify that the questionnaire accurately and comprehensively reflected the diverse teaching needs necessary to develop a "Short Weapon" curriculum.

Six education experts were recruited for this study by way of Table 1 which stated: "List of experts" followed by "Criteria". Two "Short Weapon" specialists, two physical education curriculum professors and two martial arts inheritors had studied extensively about curricula and evaluated its effectiveness through curriculum design and teaching objectives as listed above mentioned in Table 2. The first goal of the research was to provide an insight into the nature of curriculum studies and the second objective was to determine whether evaluation criteria for curricular innovation are too high or not. Meanwhile, the martial arts inheritors, with their deep understanding of martial arts pedagogy, provided insights into the practical applicability of questionnaire items in real-world teaching contexts. The criteria for selecting experts were based on their years of teaching experience, academic research achievements, and practical experience in related curriculums, ensuring the professionalism and representativeness of the review panel.

Table 1. Criteria for Expert Selection

	Criterion 1	Criterion 2	Criterion 3	Criterion 4
"Short weapons" martial arts inheritor	Possession of nationally or internationally recognized martial arts rank certificates or titles.	Over 15 years of practice and teaching experience in traditional martial arts.	Publications, papers, or other works in the field of traditional martial arts or "short weapons" that demonstrate deep understanding and contribution.	A good reputation and significant influence in the martial arts community, with high recognition from peers and students.
Physical Education Professor	Possession of a doctoral degree in physical education or related fields, and serving as a professor at a university.	Over 10 years of teaching and research experience in education.	High-level academic publications in physical education or related fields, with involvement in international or national research projects.	Well-known in the academic or educational community, with past presentations at important academic conferences or forums.
"Short weapons" professional teacher	Possession of a professional teaching qualification or training certificate related to "short weapons" and many years of teaching experience.	Over 5 years of teaching experience in "short weapons" education.	Published professional articles or textbooks on "short weapons" teaching methods or related areas, demonstrating teaching achievements.	A good reputation in the teaching field, widely recognized as an outstanding teacher by students and colleagues.



Table 2 shows the relationship between the number of experts and the acceptable cutoff score for the CVI. Specifically, when the number of experts is 2, the minimum acceptable CVI is 0.80; for 3 to 5 experts, the CVI requirement is 1; if the number of experts is between 6 and 8, the CVI should be at least 0.83; and when there are 9 experts, the minimum acceptable CVI is 0.78. Since the validation of the questionnaire in this study was conducted by 6 experts, the acceptable CVI for the questionnaire should be at least 0.83.

Table 2. Impact of Expert Number on the Acceptable CVI Score

Number of Experts	Acceptable CVI Value	Source
2 experts	At least 0.80	Davis (1992)
3-5 experts	Should be 1	Polit & Beck (2006) Polit et al. (2007)
At least 6 experts	At least 0.83	Polit & Beck (2006) Polit et al. (2007)
6-8 experts	At least 0.83	Lynn (1986)
At least 9 experts	At least 0.78	Lynn (1986)

During the expert review process, the evaluation of the questionnaire items was based on a four-point Likert scale. The experts rated each item according to its relevance and representativeness for the curriculum demand, with scores ranging from "not relevant at all" (1 point) to "highly relevant" (4 points). Experts scored each questionnaire item on its relevance to the objective and independence of the review by rating scores according to their professional judgement. The items were rated as either "relevant" ("highly relevant") or not ("not highly relevant"). Research items were then aggregated into categories and the CVI was calculated for each item based on the percentage of experts scoring it as "relevant". The CVI value was calculated using the following formula:

$$I - CVI = \frac{\text{Number of Experts Rating the Item as Relevant or Very Relevant}}{\text{Total Number of Experts}}$$

In this study, to ensure high content validity of the questionnaire items, a CVI value of 0.83 or higher was required. CVI > 0.83 means that the item is very reflective and covers most of the "Short Weapon" curriculum material; otherwise, we will adjust/review the item in accordance with expert opinion. In addition to individual-level item CVIs, this paper also estimates the Scale-Level Content Validity Index (S-CVI) (i.e., the sum of CVI values of all items). This index can be calculated as:

$$S - CVI = \frac{\sum I - CVI}{\text{Total Number of Items}}$$

An S-cvi near to 1 indicates good content validity. The questionnaire items are relevant and therefore of high quality as well. A professional expert review during the whole procedure indicated that the researcher team continuously adapted and modified the questionnaire during expert review. It was evaluated by the panel that the questionnaire is sufficiently suited to measure content validity and identifies problems that need to be further improved both in item development as well as in layout and clarity.

KMO and Bartlett's Test of Sphericity

The Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity were used to assess the appropriateness of the data set for factor analysis on the training needs of the Chinese martial arts "Short Weapon" curriculum for primary school physical education teachers. The KMO test examines the extent of sampling adequacy via comparison of simple and partial correlations coefficients between variables. A KMO value ≥ 0.7 implies that the data can be used for factor analysis. For the present study, a KMO of > 0.7 suggests robust correlations between items within the questionnaire so it may be suitable for factor analysis. Bartlett's test of sphericity examines the correlation between variables using a chi-square test. If the p-value of the test is less than 0.05 ($p < 0.05$), it indicates significant correlations between the items,



providing statistical support for factor analysis. In this study, SPSS 26.0 was used for calculations. If the Bartlett test results are significant, it indicates that the items in the questionnaire share common factors, allowing for the extraction of potential factors and validation of the questionnaire's structural validity.

Reliability

The sample for this study was drawn from primary school physical education teachers in Tianfu New Area, a national-level development zone located in Sichuan Province, China. This region encompasses multiple districts including Chengdu and Meishan, and is characterized by its integrated urban-rural educational policies, rapid infrastructure development, and strong emphasis on educational modernization. As such, the sample reflects both metropolitan and semi-rural teaching contexts, offering a balanced perspective on curriculum needs within a transitioning educational environment.

To assess the reliability of the "Short Weapons" curriculum demand analysis questionnaire for Chinese martial arts, this study administered the survey to 161 primary school physical education teachers in Tianfu New Area. The selection criterion for participants was primary school physical education teachers with substantial teaching experience, ensuring that the sample was representative and could accurately reflect the demand for "Short Weapons" curriculums among physical education teachers in the region. All participants were fully informed and signed an informed consent form before completing the survey, ensuring their voluntary participation and understanding of the research objectives and the use of the data. Data collection took place in January 2025, ensuring the timeliness of the research data. Table 3 presents the demographic statistics of the participants.

Table 3. Participant statistics

Item	Frequency	Percentage	
Gender	Male	89	55.3%
	Female	72	44.7%
Years of Teaching Experience	More than 10 years	28	17.4%
	3-5 years	35	21.7%
	Less than 3 years	52	32.3%
	5-10 years	46	28.6%
Have you participated in any specialized sports training?	No	14	8.7%
	Yes	147	91.3%
Have you heard of the "Short Weapons" curriculum?	No	104	64.6%
	Yes	57	35.4%
If the school offers a "Short Weapons" curriculum, how interested would you be in teaching it?	Very interested	60	37.3%
	Moderately interested	67	41.6%
	Slightly interested	28	17.4%
	Not very interested	4	2.5%
	Not interested at all	2	1.2%

The degree of validity was also evaluated using Cronbach's Alpha. The results obtained in this study have been considered reliable because the test has good reliability coefficients. Cronbach's Alpha values range from 0–1, the closer they are to 1 the stronger the internal consistency is. Generally speaking, $\alpha \geq 0.8$ means great reliability, $0.7 \leq \alpha < 0.9$ means good reliability, $0.6 \leq \alpha < 0.9$ means moderate reliability, $0.5 \leq \alpha < 0.5$ means poor reliability, and $\alpha < 0.5$ means lack of reliability. Researchers may use the values derived above to see how reliable a given questionnaire is and what changes should be made. For example, in this paper, SPSS 26.0 was utilized to calculate Cronbach's Alpha coefficient for an analysis of 161 valid questionnaires that tested general internal consistency as well as examining interdimensional coherence. Table 4 provides an interpretation of Cronbach's Alpha values (Bond & Fox, 2015).

Table 4. Interpretation of Cronbach's Alpha Values (Bond & Fox, 2015)

Cronbach's Alpha Value	Interpretation
$0.8 \leq \alpha < 1$	Very high internal consistency, excellent reliability
$0.7 \leq \alpha < 0.79$	Good internal consistency, high reliability
$0.6 \leq \alpha < 0.69$	Acceptable internal consistency, moderate reliability
$0.5 \leq \alpha < 0.59$	Poor internal consistency, low reliability
$\alpha < 0.5$	Poor internal consistency, insufficient reliability



Instruments

Needs Analysis Questionnaire

To develop a scientifically robust instrument for assessing the needs of primary school physical education teachers regarding the “short weapons” curriculum, this study draws upon several well-established theoretical foundations. Central among these is the Shulman (1987) framework of teacher knowledge, particularly the integration of pedagogical content knowledge (PCK) with subject-specific instructional strategies (Shulman 1987). In terms of structural design, the questionnaire is informed by Kaufman and English’s (1979) multi-level needs assessment model, which provides a systematic approach to categorizing educational needs across dimensions such as knowledge, skills, resources, and goals (Kaufman et al. 1979)].

During the item development phase, the research team incorporated insights from recent advances in educational technology integration and curriculum design. The structured needs frameworks proposed by Mustafa. (2015), and the diagnostic indicators for teacher professional development outlined by O’Reilly (2016), were used to refine and contextualize item construction (Mustafa et al. 2015; O’Reilly 2016). The development process began with an extensive literature review, from which preliminary dimensions and items were derived. Subsequently, the three-part structure of the questionnaire was adapted and expanded based on Shriki (2016) model of teacher-perceived instructional needs in primary education (Shriki et al. 2016).

It is important to note that the validation and reliability analyses in this study were applied exclusively to the second section of the questionnaire, which contains the core set of Likert-scaled items assessing teachers’ perceived needs. The first and third sections—demographic information and open-ended feedback—served a supplementary role and were not included in the psychometric evaluation.

The first section of the questionnaire is designed to collect respondents’ personal information, including gender, years of teaching experience, and willingness to teach the “short weapons” curriculum. These data assist the researchers in statistically describing the basic characteristics of the sample and provide necessary background information for subsequent analysis. The second part of the questionnaire consists of 31 items (A1–A31) regarding the teachers’ needs for use of the martial arts “short weapons” curriculum covering topics related to curricular information, methods of instruction, teaching tools, students, and class schedules. Among the items are those dealing with teachers’ reported needs for several aspects, such as: curriculum; techniques; equipment; instruction; students; and class schedule. The evaluation items were rated on a five-point Likert scale, where respondents indicated their degree of need (“not needed at all,” or “strongly needed”). The third part of the questionnaire contains an open-ended question asking respondents how far they see their “martial arts” curricula should include “short weapons.” Respondents have the option of answering “as far as possible;” in other words, the respondents’ answers are only solicited if they actually experienced those curricula themselves and therefore might be able to best advise the authors of the study. This information can only be solicited from respondents who choose to answer open-end questions.

Content Validity Questionnaire

The aim of this study was to assess the content validity of the second part of the needs analysis questionnaire by means of the elaboration of a validated validity assessment questionnaire in which each item is analyzed more specifically. For each item a four point scale method was used whereby reviewers scored items according to whether they met the needs as described by the design objectives and the needs themselves. The following scales were used; ‘highly suitable’ = the item fits the requirements, ‘requires minor corrections’ means that the item is not quite correct, ‘requires major corrections’ means the item is significantly wrong, whereas ‘not suitable’ means that it is not usable at all. Using this approach, we could examine systematically the appropriateness of individual items in part two of the needs analysis questionnaire. This methodology provides strong assurance of the evaluation process so that further modification to the questionnaire may be scientifically sound.

Data Collection Procedure

For collecting data, the proposal and consent were obtained from the sports education department in Tianfu New Area; then, based on the above-mentioned protocol, the research plan was submitted and



the questionnaire design was issued by the education management department through the “Wenjuanxing” platform, where the ethics declaration including the research aim, volunteerism, data privacy, and using only the collected data for educational researches were clearly stated. Participants agreed to read and understand the Ethics Statement beforehand.

After that, the researcher sent out the questionnaire link through WeChat, enabling Tianfu New Area’s primary school physical education teachers to fill it conveniently and easily without affecting their schedules due to time or geographical boundaries. Clicking the link can obtain the questionnaire online, which will help reduce time and labor consumption and improve the overall response rate. Secondly, after conducting the ethics approval and ethical analysis procedures, we uploaded the signed consent form on our website, collecting the students’ personal information including gender and grade level. Thirdly, the researchers followed up and solved the problems in time according to participants’ messages. Therefore, this study improved its response rate as well as data completeness and validity.

Even though the Kaiser-Meyer-Olkin measure and Bartlett test of sphericity showed that the data fit the statistical requirements of factor analysis, neither exploratory nor confirmatory factor analyses of data were carried out in the current study. This methodological choice was not accidental and corresponded to the main goal of the given research which was to determine content validity and internal consistency at the first stage of the development of the instrument. Since the construct is culturally specific, and the sample size is relatively homogeneous, the authors were more concerned with expert-based validation and reliability assessment to understand the conceptual clarity and practical relevance and proceed with dimensional reduction only after doing so. Additional research on the structural validity of the instrument should be conducted to make future studies with broader and varied samples that would conduct the exploratory and confirmatory factors analysis.

Results

The findings of the present investigation can be categorized under the following sections—namely, (1) validity analysis; (2) determination of the KMO and Bartlett's tests of sphericity as well as (3) reliability evaluation.

Validity

Face Validity

The demand analysis questionnaire was found to have good face validity, with expert reviewers agreeing in all cases that it accurately reflected the aims of the study as well as the actual requirements of primary school physical education teachers for the “Short Weapon” martial arts curriculum. While the experts generally endorsed the questionnaire, they provided minor suggestions primarily related to wording and phrasing refinements. Based on their feedback, the questionnaire underwent targeted modifications to enhance accuracy and clarity. One identified issue was the redundancy between “curriculum teaching resources” and “curriculum teaching materials.” Experts recommended merging these items to avoid repetition. In response, the research team retained only the “curriculum teaching resources” item while removing the reference to “curriculum teaching materials,” ensuring greater conciseness and logical coherence.

Content Validity

This study systematically evaluated the validity of the questionnaire items using the Content Validity Index (CVI). A total of six experts were invited to participate in the questionnaire review. The evaluation process used a four-point Likert scale (1 representing “completely irrelevant” and 4 representing “highly relevant”) to independently assess the relevance and representativeness of each item. The Content Validity Index (I-CVI) for each item was calculated by determining the proportion of experts who rated the item as “relevant” or “highly relevant.” As shown in Table 5, most items achieved an I-CVI value of 1.00, indicating unanimous expert agreement on their relevance and representativeness. This result confirms the questionnaire's effectiveness in assessing the development needs of the “Chinese Martial Arts 'Short Weapons' curriculum,” demonstrating strong content validity.



Table 5. Scoring of the Demand Analysis Questionnaire

Item	E1	E2	E3	E4	E5	E6	Number of Experts Agreeing	I-CVI	S-CVI
A1	1	1	1	1	1	1	6	1.00	
A2	1	1	1	1	1	1	6	1.00	
A3	1	1	1	1	1	1	6	1.00	
A4	1	1	1	1	1	1	6	1.00	
A5	1	1	1	1	1	1	6	1.00	
A6	1	1	1	1	1	1	6	1.00	
A7	1	1	0	1	1	1	5	0.83	
A8	1	1	1	1	1	1	6	1.00	
A9	1	1	1	1	1	1	6	1.00	
A10	1	1	1	1	1	1	6	1.00	
A11	1	1	1	1	1	1	6	1.00	
A12	1	1	1	1	1	1	6	1.00	
A13	1	1	1	1	1	1	6	1.00	
A14	1	1	1	1	1	1	6	1.00	
A15	1	1	1	1	1	1	6	1.00	
A16	1	0	1	1	1	1	5	0.83	0.97
A17	1	1	1	1	1	1	6	1.00	
A18	1	1	1	1	1	1	6	1.00	
A19	1	1	1	1	1	1	6	1.00	
A20	1	1	1	1	1	1	6	1.00	
A21	1	0	1	1	1	1	5	0.83	
A22	1	1	1	1	1	1	6	1.00	
A23	1	1	1	1	1	0	5	0.83	
A24	1	1	1	1	1	1	6	1.00	
A25	1	1	1	1	1	0	5	0.83	
A26	1	1	1	1	1	1	6	1.00	
A27	0	1	1	1	1	1	5	0.83	
A28	1	1	1	1	1	1	6	1.00	
A29	1	1	1	1	1	1	6	1.00	
A30	1	1	1	1	1	1	6	1.00	
A31	1	1	1	1	1	1	6	1.00	

However, certain items, such as A7, A21, A23, and A25, exhibited I-CVI values ranging from 0.83 to 1.00, indicating some degree of expert disagreement in their evaluation. Although these items still meet the minimum validity criteria, the research team plans to further refine them based on expert feedback to enhance their relevance and representativeness, ensuring that the questionnaire more accurately reflects the curriculum's needs. The overall content validity assessment, measured by the Scale-Level Content Validity Index (S-CVI), yielded a value of 0.97, indicating strong relevance and representativeness. With an S-CVI approaching 1.00, the questionnaire demonstrates high effectiveness in capturing the intended assessment areas. Based on expert feedback, the research team made targeted revisions to specific items to further enhance content comprehensiveness and accuracy.

KMO and Bartlett's Test of Sphericity

As shown in Table 6, the KMO value for this dataset is 0.959, significantly exceeding the 0.7 threshold, indicating strong suitability for factor analysis. A KMO value close to unity implies good fit between variables, allowing appropriate factor extraction without doubt about factor structure while Bartlett's test of sphericity was significant at $p = .000$ ($p < 0.05$), indicating that the data set also exhibits significant correlations among questionnaire items. The findings are consistent with the notion that the dataset comprises shared latent structures for which factor analysis is an appropriate tool in examining the structure of the questionnaire.

Table 6. KMO and Bartlett's Test of Sphericity

KMO Sampling Adequacy Measure		0.959
Bartlett's Test of Sphericity	Approximate Chi-Square	7620.549
	Degrees of Freedom	465
	Significance	0.000

Reliability

To assess the validity of the Chinese "Short Weapon" curriculum needs assessment questionnaire, we used Cronbach's Alpha as the dependent variable. Specifically, it is an external statistic with an assumed



to be normally distributed variable. Under Cronbach's definition, an α value close to 1 means that the questionnaire has excellent internal consistency. Conversely, lower values indicate weaker correlations between items, which may affect the reliability of the questionnaire. In this study, SPSS 26.0 software was used to calculate Cronbach's Alpha for 161 valid questionnaires. As shown in Table 7, the Cronbach's Alpha value for the questionnaire was 0.980, indicating very high internal consistency. The high correlation between the items indicates that the questionnaire can reliably and consistently reflect the construct of "primary school physical education teachers' needs for the development of the 'short weapons' curriculum." The Cronbach's 4 coefficient of 0.980 indicates high internal consistency but on the other hand, high coefficient can point to redundancy of some items in the questionnaire. The findings then can be viewed with some reservations particularly given the narrow and relatively homogenous nature of the group of participants. In this context, the high alpha probably implies high conceptual coherence, but not semantic replica. However, the further development of the instrument may be associated with the reduction of items strategies or factor anatomic methods that are supposed to improve the efficiency of the instrument with preservation of the complete coverage of the content.

Table 7. Cronbach's Alpha Value for the Needs Analysis Questionnaire

Number of Items	Cronbach's Alpha	Reliability Level
31	0.980	Very high internal consistency, excellent reliability

This result indicates that the questionnaire demonstrates high reliability in assessing elementary school physical education teachers' needs for the Chinese martial arts "short weapon" curriculum, ensuring the stability and consistency of the measurement results. The high Cronbach's alpha value indicates that the dimensions and items of the questionnaire effectively reflect the research objectives, ensuring the reliability of the instrument. Therefore, the questionnaire used in this study will provide solid reliability support for the subsequent data analysis, ensuring a comprehensive and accurate measurement of teachers' needs. Additionally, based on this high alpha value, the study demonstrates that the questionnaire already exhibits good reliability, and no further modifications or optimizations to its content are necessary.

Discussions

This study conducted a comprehensive assessment of the validity and reliability of the Chinese martial arts "Short Weapon" curriculum needs analysis questionnaire. Although the I-CVI values of a few departmental items were between 0.83 and 1.00, which only showed that there were small differences in the expert evaluation results, they ultimately met the minimum content validity standards and were improved based on expert feedback to improve the clarity and accuracy of the questionnaire.

The KMO value calculated is 0.959, which is significantly higher than the threshold of 0.7, indicating that the sampling is sufficient; the Bartlett test significance value calculated is 0.000, which is much lower than 0.05, indicating that there is a significant factor structure correlation between the questionnaire items.

In the reliability analysis, Cronbach's Alpha value was used to evaluate the internal consistency of the questionnaire. The Cronbach's Alpha value calculated is 0.980, which is significantly higher than the threshold of 0.8, indicating that the reliability of the questionnaire is excellent. It shows that there is a strong correlation between the questionnaire items, ensuring the consistency of the measurement of the teacher needs of the "Short Weapon" curriculum.

It is important to note that the construct under investigation in the current research is culturally framed to the Chinese tradition of education and martial-arts. Historical, cultural, and policy-specific aspects have an impact on elements like curriculum needs, instructional priorities, and pedagogical expectations in martial-arts education. Based on this discussion, even though the questionnaire possesses strong psychometric qualities in the scenario under study, one should be very cautious when generalizing the findings to others, unlike learning institutions.



In the global perspective, the tool can be perceived as a context-sensitive model that demonstrates how the culturally entrenched and embedded physical education content can be operationalized using the universal psychometrics. Future cross-cultural adaptations and validation research will help to increase its usability and allow the use of it in comparative studies in the field of global physical education and martial-arts teaching.

Limitations

While this study provides a valuable tool and empirical foundation for analyzing the demand for the “short weapons” curriculum, certain limitations remain that warrant attention in future research. The sample consisted of 161 primary school physical education teachers from Tianfu New Area, which—although representative—may not fully reflect the broader national landscape of curriculum needs. Tianfu New Area is a national-level development zone spanning Chengdu and Meishan in Southwest China, characterized by a blend of urban and semi-rural districts, progressive educational policies, and integrated school development. Despite its diversity, the sample’s contextual specificity still warrants caution in generalizing the findings. Future research should consider expanding the sampling scope to include teachers from varied regions and school types to enhance external validity. Moreover, replication studies in international settings—particularly in Asian countries with comparable martial arts traditions—are recommended to test the instrument’s cross-cultural applicability and broaden its global relevance.

Although the validity and reliability of the questionnaire have been validated, some items’ wording and phrasing may still lead to understanding biases, particularly in regions with significant cultural differences. Some suggestions raised during the expert review process highlighted redundancy and lack of clarity in the expression of certain items. Although modifications were made accordingly, there is still room for further improvement. Therefore, future research should further consider the needs of respondents from different educational and cultural backgrounds in the questionnaire design to ensure the universality and clarity of the content.

Additionally, due to the absence of factor-analytic validation, the conclusions that can be made regarding the internal dimensional structure of the questionnaire are limited, which should be corrected in the next research stages.

Conclusion

This study’s objective was to produce a “short weapon” martial arts curriculum demand assessment questionnaire for elementary school physical education instructors and evaluate its validity and reliability using scientific approaches. The findings of this study show that the questionnaire is valid and reliable and is able to capture actual needs of primary school physical education instructor “Short Weapon” curriculum. In addition, based on expert reviews and CVI evaluation, it has been widely recognized that most questionnaire items are highly correlated with each other. Most items were rated as having an I-CVI score of at least 1.0. Only a limited number of items had a slight higher or lower I-CVI than the overall score of 1.00. However, they both passed the validity test and all criteria used in the validity test. After modification according to expert opinion, they were further cleaned up to improve interpretation, making sure that the questionnaire is accurate in terms of dimensionality, while the data were found to be sufficiently reliable by KMO and Bartlett’s tests of sphericity. These findings suggested that the proposed model could be based on a number of correlated variables in addition to the survey items examined previously. The calculation of Cronbach’s α coefficient reveals that the questionnaire has very high internal consistency ($\alpha = 0.980$), further confirming its high reliability and ensuring its stability and reliability in practical application.

In conclusion, the “short weapon” martial arts curriculum demand assessment questionnaire developed in this study not only demonstrates good validity and reliability but also effectively reflects the teaching needs of elementary school physical education teachers. This questionnaire provides scientific evidence and data support for the future design of the “short weapon” martial arts curriculum, teacher training,



and teaching Materials development, offering a theoretical foundation for the optimization and implementation of martial arts curriculums at the elementary school stage. The validity and reliability verification results of the questionnaire provide a powerful tool for the continuous improvement of the curriculum and the precise identification of teachers' needs, promoting the scientific development of related educational practices.

Competing Interests Declaration

The author declare that there are no competing interests related to this article.

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