apunts EDUCACIÓN FÍSICA Y DEPORTES

ISSUE 153

Published July 1, 2023
https://doi.org/10.5672/apunts.2014-0983.es.(2023/3).153.04

PHYSICAL EDUCATION

OPEN ACCESS

Assessment Aspects of Student's Motor Skills and Assessment Tools in Physical Education

Maite Zubillaga-Olague[1]*, Laura Cañadas[1] & André Moura[2]

[1] Department of Physical Education, Sport and Human Motricity. Faculty of Teacher Training and Education. Autonomous University of Madrid (Spain).
[2] Department of Physical Education and Sports Sciences, University of Limerick (Ireland).

Cite this article
Zubillaga-Olague; M., Cañadas, L. & Moura, A. (2023). Assessment aspects of student's motor skills and assessment tools in physical education. *Apunts Educación Física y Deportes, 153*, 27-38. https://doi.org/10.5672/apunts.2014-0983.es.(2023/3).153.03

Editor:
© Generalitat de Catalunya
Departament de la Presidència
Institut Nacional d'Educació Física de Catalunya (INEFC)

ISSN: 2014-0983

***Corresponding author:**
Maite Zubillaga-Olague
maite.zubillaga@uam.es

Section:
Physical Education

Original language:
Spanish

Received:
September 2, 2022

Accepted:
December 14, 2022

Published:
July 1, 2023

Front cover:
Two surfers practicing freestyle kitesurfing. Adobestock ©MandicJovan. Mediteraneo

Abstract

Educational developments call for a change in the way in which aspects related to students' motor skills are assessed in the field of physical education, moving towards a global assessment that goes beyond assessment centred on physical performance. This research aims: (i) to analyse the most and least valued variables in relation to the assessment aspects of student motor skills and the type of assessment tools used by PE teachers; (ii) to assess whether there are statistically significant differences in these aspects among Primary and Secondary school teachers, according to teaching experience, according to the highest academic degree obtained and the type of school in which they teach; and (iii) to assess the relationship between the assessment tools used and the aspects that are assessed in relation to student motor skills. Quantitative, comparative, correlational and cross-sectional research was carried out. A total of 455 physical education teachers from all over Spain took part. The data was collected through the *Questionnaire on Assessment Processes in Physical Education #AssessPE*. The results demonstrated that among the assessment aspects of students' motor skills, teachers reported giving greater importance to whether students know and respect health and hygiene habits and motor problem solving. In terms of assessment tools, teachers indicate that those most frequently used are contextualised game situations and observation sheets, with tests being the least frequently used. There are some differences in these aspects depending on the variables studied, although they are not constant. Finally, there is no clear relationship between most of the assessment tools studied and the motor skill assessment aspects.

Keywords: assessment, motor skills, physical education, teachers, tools.

Introduction

Traditionally, assessment in physical education (PE) has been associated with the measurement of students' physical fitness and performance (Secchi et al., 2016) with a view to ranking students (López-Pastor et al., 2013). As a result, the use of examinations and tests of physical fitness or perceptual-motor skills as assessment tools for assessing student performance has prevailed (López-Pastor et al., 2013; Secchi et al., 2016). However, changes in educational paradigms, in the way of understanding PE and assessment, have increased the importance of assessing aspects other than physical performance (Cañadas et al., 2019; James et al., 2005), such as the improvement and progress of students from their starting point (Chng & Lund, 2018; Chróinín & Cosgrave, 2013; Hortigüela-Alcalá & Pérez-Pueyo, 2016). Among these aspects, aspects such as attitudes, creativity, understanding of how to apply sporting tactics or certain techniques in the natural environment are beginning to be considered (Fisette & Franck, 2013; Sicilia et al., 2006). Furthermore, the current curriculum (Royal Decree 157/2022; Royal Decree 217/2022) establishes that the field of PE should contribute to the all-round development of students. In this way, varied learning situations should be offered which allow students to develop all their abilities, and in which their progress in all areas can be assessed (Holfelder & Schott, 2014; Organic Law 3/2022;). To this end, an increasing number of assessment tools are emerging to assess students' competences and skills (Herrán et al., 2019; Otero & González, 2016; Pérez-Pueyo et al., 2019).

In recent decades there has been a growing academic interest in alternative assessment processes in PE, however, when analysing the assessment practices developed by PE teachers in their classes, this change is not apparent (MacPhail & Murphy, 2017; Moura et al., 2021). For this reason, it is essential to find out how teachers carry out their assessment process and to analyse what and how they assess. Along these lines, Cañadas & Santos-Pastor (2021) find that PE teachers consider that procedural, attitudinal and conceptual aspects should be assessed. At primary level, the latter two do not play a major role in assessment, whereas at secondary level, conceptual learning seems to be assessed more systematically. Furthermore, they demonstrate that observation sheets tend to be one of the most commonly used tools in both Primary and Secondary Education for the procedural domain, and informal procedures are used for the rest. The study by Rodríguez-Negro & Zulaika (2016) shows that, while theoretical tests are rarely used in Primary Education, they are used more frequently by Secondary Education teachers. These aspects may be influenced by many factors such as the level of education, teaching experience and teacher training. In the study conducted by Chaverra (2014), the participating teachers associate reflections on their assessment practices and years of experience with the development of formative assessment practices. All of them report having used assessment tools to measure the physical fitness of students, especially in their first years as teachers. However, experience has prompted them to reflect on their lack of formative content and to use other, more qualitative tools to collect data on the different dimensions of learning. Along these lines, teachers report that they attach particular importance to the assessment of attitudes in their PE lessons.

For this reason, and with the aim of exploring this subject in greater depth, the objectives of this research are as follows: (i) to analyse the most and least valued variables in relation to the assessment aspects of student motor skills and the type of assessment tools used by PE teachers; (ii) to assess whether there are statistically significant differences in these aspects among Primary and Secondary school teachers, according to teaching experience, according to the highest academic degree obtained and the type of school in which they teach; and (iii) to assess the relationship between the assessment tools used and the aspects that are assessed in relation to student motor skills.

Method

Quantitative, comparative, correlational and cross-sectional research was carried out.

Participants

455 Spanish PE teachers of Primary Education (51.9%) and Secondary Education (48.1%), with a mean age of 41.6 years (SD ± 9.43), participated in this research. Participants were selected by random, incidental, non-probabilistic sampling. Full information on the participants can be found in Table 1.

Table 1
Characteristics of the participating sample.

Variables		%
Sex	Female	36.7
	Male	63.6
Teaching experience	0-10 years	36.0
	11-20 years	34.5
	21-40 years	29.5
Level of education taught	Primary	51.9
	Secondary	48.1
School ownership	Public	75.8
	Fully private	21.5
	State-funded private	2.6
Highest Academic Degree Obtained	Degree	28.8
	Bachelor's degree	8.1
	Diploma	11.4
	Master's Degree	27.0
	Doctorate	3.3
	PAC	19.8
	Postgraduate	1.5

Instrument

The *Questionnaire on Assessment Processes in Physical Education #AssessPE* (Zubillaga-Olague & Cañadas, 2021) was used to collect data. It is a questionnaire designed *ad hoc*, consisting of 81 items divided into 13 Likert-type closed-responses with 6 response levels ranging from 1 (never/strongly disagree) to 6 (always/strongly agree). The scale had an internal consistency of $\alpha = .95$. Of all the items included in the questionnaire for this research, those corresponding to the dimensions of the aspects related to motor skill assessment and the assessment tools used by the teachers were taken into account. Table 2 lists the items used in this research.

Procedure

The e-mail addresses of all Spanish schools and institutes that provide this information freely and openly on their websites were collected. After designing and validating the questionnaire, it was transcribed into the Google Forms platform and sent by email to the schools. In the e-mail, PE teachers were asked to participate in filling in the questionnaire. In accordance with the ethical principles of research (American Psychological Association, 2010), an information sheet and an informed consent form were attached to the email. The research was approved by the Ethics Committee of the Autonomous University of Madrid on 24 April 2020.

Table 2
Items related to the assessment aspects of students' motor skills and the assessment tools used.

Assessment aspects of students' motor skills
I assess the correct technical execution (gestures, forms specific to each sport modality) of sport skills
I assess the use of tactical elements (individual or collective / cooperative and oppositional) in game situations
I assess the application of the rules (knowledge, applications, use, etc.) in game situations
I assess the physical fitness of the student
I assess motor problem solving (basic, specific, sporting, etc. motor skills and abilities)
I assess students' ability to make artistic and expressive creations
I assess the execution of dance techniques and/or dances
I assess students' ability to carry out activities in the natural environment
I assess whether students know and respect health and hygiene habits in the practice of physical activity
Assessment tools used
Observation sheet
Rubrics
Exam
Motor tests
Psychomotor skills test
Contextualised game situations
Physical fitness test

Statistical Analysis

The Kolmogorov-Smirnov test was used to analyse the normality of the data. As the distribution was not normal, non-parametric analyses were carried out. In response to the first objective, the descriptive data on the sample for the variables studied are presented (Table 2). For the second objective, to test for differences between primary and secondary school teachers according to the highest academic degree obtained and the ownership of the school in which they teach, the Mann-Whitney U test was used, and to test for differences according to teaching experience, the Kruskal-Wallis H test was used. In order to carry out the analysis according to school ownership, teachers working in fully private and state-funded private schools were grouped together in the same variable and, in order to analyse according to the highest academic degree, those with a bachelor's degree (undergraduate, graduate, diploma) and postgraduate level (master's degree, doctorate, PAC and other postgraduate degrees) were grouped together. Finally, Spearman's correlation was used to assess the relationship between the assessment tools used and the assessment aspects of students' motor skills. Analyses were performed with SPSS v. 27. statistical software and the significance level was set at $p < .05$.

Results

Table 3 shows the descriptions of the assessment aspects of students' motor skills and of the assessment tools used, and the differences according to the level of education at which teaching is carried out (primary vs. secondary).

Table 3
Differences in the assessment aspects of students' motor skills and the assessment tools used, and according to the level of education at which teaching is carried out.

	Total	Primary Education	Secondary Education	
	M ± SD	M ± SD	M ± SD	
n,	455	236	219	*p*
Assessment aspects of motor skills				
I assess the correct technical execution (gestures, forms specific to each sport modality) of sport skills	4.13 ± 1.33	3.91 ± 1.30	4.37 ± 1.32	**.000****
I assess the use of tactical elements (individual or collective/cooperative and oppositional) in game situations	4.50 ± 1.18	4.43 ± 1.21	4.58 ± 1.14	.280
I assess the application of the rules (knowledge, applications, use, etc.) in game situations	4.38 ± 1.22	4.32 ± 1.22	4.44 ± 1.22	.249
I assess the physical fitness of the student	3.75 ± 1.44	3.50 ± 1.33	4.01 ± 1.51	**.000****
I assess motor problem solving (basic, specific, sporting, etc. motor skills and abilities)	5.00 ± 1.05	5.01 ± 1.12	5.00 ± 0.97	.467
I assess students' ability to make artistic and expressive creations	4.96 ± 1.08	4.86 ± 1.11	5.07 ± 1.05	**.015***
I assess the execution of dance techniques and/or dances	4.23 ± 1.32	4.14 ± 1.27	4.33 ± 1.37	.093
I assess students' ability to carry out activities in the natural environment	4.32 ± 1.31	4.28 ± 1.33	4.37 ± 1.29	.559
I assess whether students know and respect health and hygiene habits in the practice of physical activity	5.18 ± 1.09	5.21 ± 1.12	5.15 ± 1.06	.317

Note. Statistically significant differences are in **bold:** *$p < .05$ **$p < .001$.

Table 3 (Continuation)
Differences in the assessment aspects of students' motor skills and the assessment tools used, and according to the level of education at which teaching is carried out.

	Total	Primary Education	Secondary Education	
	M ± SD	M ± SD	M ± SD	
n,	455	236	219	*p*
Assessment tools				
Observation sheet	4.76 ± 1.14	4.75 ± 1.16	4.76 ± 1.12	.933
Rubrics	4.45 ± 1.52	4.36 ± 1.54	4.55 ± 1.49	.159
Exam	2.84 ± 1.59	2.16 ± 1.33	3.58 ± 1.51	**.000****
Motor tests	2.67 ± 1.63	2.54 ± 1.53	2.81 ± 1.72	.135
Psychomotor skills test	2.50 ± 1.59	2.60 ± 1.58	2.38 ± 1.60	.091
Contextualised game situations	4.85 ± 1.17	4.78 ± 1.21	4.94 ± 1.12	.176
Physical fitness test	3.04 ± 1.63	2.41 ± 1.38	3.72 ± 1.61	**.000****

Note. Statistically significant differences are in **bold:** *$p < .05$ **$p < .001$.

Results show that the items that show a higher degree of consensus on the part of the teachers are: (i) I assess whether the students know and respect health and hygiene habits in the practice of physical activity (5.18 ± 1.09) and (ii) I assess motor problem solving (5.00 ± 1.05). The item that shows the lowest degree of consensus is the assessment of the physical fitness of the students (3.75 ± 1.44). On the other hand, the tools most frequently used by teachers on average are contextualised play situations (4.85 ± 1.17) and the least frequently used are motor tests (2.67 ± 1.63) and psychomotor tests (2.50 ± 1.59), which are below the average level of response on the scale. The differences in the assessment aspects of students' motor skills among teachers who teach at different educational levels appear in 3 of the 9 items studied. Specifically in: (i) I assess the correct technical execution of sport skills ($p < .001$; 3.91 ± 1.30 vs. 4.37 ± 1.32); (ii) I assess the physical fitness of the students ($p < .001$; 3.50 ± 1.33 vs. 4.01 ± 1.51) and I assess students' ability to make artistic and expressive creations ($p = .015$; 4.86 ± 1.11 vs. 5.07 ± 1.05), showing higher mean values for secondary education teachers in all cases. In the assessment tools, statistically significant differences appear according to the level of education at which teaching is provided in 2 of the 7 items studied ($p < .001$): (i) Exam (2.16 ± 1.33 vs. 3.58 ± 1.51); and (ii) physical fitness test (2.41 ± 1.38 vs. 3.72 ± 1.61), with Secondary Education teachers in both cases obtaining higher average usage values.

The differences in the assessment aspects of students' motor skills according to teaching experience are presented in Table 4. Of the 9 items studied, 7 show statistically significant differences among the groups, with the group with the least teaching experience showing the highest mean values. These are: (i) I assess the use of tactical elements in game situations ($p < .001$; 4.66 ± 1.13 vs. 4.55 ± 1.26 vs. 4.24 ± 1.11); (ii) I assess the application of the rules in game situations ($p < .001$; 4.61 ± 1.13 vs. 4.47 ± 1.24; 3.99 ± 1.20); (iii) I assess motor problem solving ($p = .030$; 5.19 ± 0.88 vs. 4.88 ± 1.23 vs. 4.93 ± 0.99); (iv) I assess students' ability to make artistic and expressive creations ($p = .012$; 5.15 ± 0.95 vs. 4.87 ± 1.23 vs. 4.83 ± 1.03); and (v) I assess students' ability to carry out activities in the natural environment ($p = .012$; 4.48 ± 1.32 vs. 4.34 ± 1.32 vs. 4.10 ± 1.26). In the case of the items I assess the physical fitness of the students ($p = .043$; 3.58 ± 1.34 vs. 3.95 ± 1.55 vs. 3.71 ± 1.40) and I assess the technical execution of dances ($p = .026$; 4.23 ± 1.26 vs. 4.38 ± 1.41 vs. 4.06 ± 1.27), teachers with 11-20 years of experience show the highest mean values. Table 4 also shows the difference in the tools used by PE teachers according to teaching experience. Statistically significant differences are found in 3 of the 7 items studied: (i) rubrics ($p < .001$; 4.88 ± 1.44 vs. 4.56 ± 1.35 vs. 3.80 ± 1.59) and (ii) contextualised game situations ($p = .013$; 4.97 ± 1.09 vs. 4.93 ± 1.19 vs. 4.63 ± 1.21), teachers with less teaching experience report using these most frequently, and teachers with more experience use these the least. On the other hand, statistically significant differences appear in the use of exams ($p = .043$; 2.73 ± 1.49 vs. 2.72 ± 1.66 vs. 3.12 ± 1.59), with more experienced teachers claiming to use these more often.

Table 4
Differences in the assessment aspects of students' motor skills and the assessment tools used according to teaching experience.

	0-10 years	11-20 years	21-40 years	
	M ± SD	M ± SD	M ± SD	
n,	168	158	143	*p*
Assessment aspects of motor skills				
I assess the correct technical execution (gestures, forms specific to each sport modality) of sport skills	4.26 ± 1.24	4.05 ± 1.44	4.06 ± 1.29	.354
I assess the use of tactical elements (individual or collective/cooperative and oppositional) in game situations	4.66 ± 1.13	4.55 ± 1.26	4.24 ± 1.11	**.000****
I assess the application of the rules (knowledge, applications, use, etc.) in game situations	4.61 ± 1.13	4.47 ± 1.24	3.99 ± 1.20	**.000****
I assess the physical fitness of the student	3.58 ± 1.34	3.95 ± 1.55	3.71 ± 1.40	**.043***
I assess motor problem solving (basic, specific, sporting, etc. motor skills and abilities)	5.19 ± 0.88	4.88 ± 1.23	4.93 ± 0.99	**.030***
I assess students' ability to make artistic and expressive creations	5.15 ± 0.95	4.87 ± 1.23	4.83 ± 1.03	**.012***
I assess the execution of dance techniques and/or dances	4.23 ± 1.26	4.38 ± 1.41	4.06 ± 1.27	**.026***
I assess students' ability to carry out activities in the natural environment	4.48 ± 1.32	4.34 ± 1.32	4.10 ± 1.26	**.012***
I assess whether students know and respect health and hygiene habits in the practice of physical activity	5.28 ± 0.97	5.14 ± 1.26	5.10 ± 0.99	.126
Assessment tools				
Observation sheet	4.77 ± 1.18	4.85 ± 1.06	4.63 ± 1.18	.316
Rubrics	4.88 ± 1.44	4.56 ± 1.35	3.80 ± 1.59	**.000****
Exam	2.73 ± 1.49	2.72 ± 1.66	3.12 ± 1.59	**.043***
Motor tests	2.60 ± 1.54	2.83 ± 1.77	2.57 ± 1.56	.527
Psychomotor skills test	2.37 ± 1.49	2.66 ± 1.74	2.47 ± 1.51	.496
Contextualised game situations	4.97±1.09	4.93 ± 1.19	4.63 ± 1.21	**.013***
Physical fitness test	2.84±1.59	3.14 ± 1.74	3.17 ± 1.54	.138

Note. Statistically significant differences are in **bold:** *$p < .05$ **$p < .001$.

Table 5 shows the differences in the assessment aspects of students' motor skills and in the use of the assessment tools according to school ownership. With regard to the assessment aspects of students' motor skills, only 4 of the 9 items studied show statistically significant differences according to school ownership. In 3 of these, it is public school teachers who show the highest average values. Specifically in: (i) I assess students' ability to make artistic and expressive creations ($p = .003$; 5.02 ± 1.10 vs. 4.47 ± 1.02); (ii) I assess students' ability to carry out activities in the natural environment ($p = .004$; 4.41 ± 1.27 vs. 4.03 ± 1.38); and (iii) I assess whether students know and respect health and hygiene habits in the practice of physical activity ($p = .018$; 5.25 ± 1.05 vs. 4.96 ± 1.19). Finally, in

the item I assess the correct technical execution of sport skills, private school teachers give greater importance to this aspect when assessing students' motor skills, obtaining higher mean values (p = .002; 4.03 ± 1.24 vs. 4.45 ± .25). With regard to differences in the frequency of use of the tools by public and private school teachers, statistically significant differences were found in 4 of the 7 items analysed. In three of these, private school teachers show higher mean values: (i) motor test (p = .004; 2.54 ± 1.57 vs. 3.08 ± 1.75), psychomotor skills test (p < .001; 2.34 ± 1.53 vs. 2.97 ± 1.68) and physical fitness test (p = .004; 2.91 ± 1.57 vs. 3.45 ± 1.75), with private schools teachers being the most frequent users in all cases. Statistically significant differences also appear in the use of rubrics (p = .009; 4.58 ± 1.42 vs. 4.05 ± 1.73) with public school teachers reporting using them to a greater extent.

Table 5
Differences in the assessment aspects of students' motor skills and the assessment tools used according to school ownership.

	Public	Fully private	
	M ± SD	M ± SD	
n,	345	110	*p*
Assessment aspects of motor skills			
I assess the correct technical execution (gestures, forms specific to each sport modality) of sport skills	4.03 ± 1.24	4.45 ± 1.25	**.002***
I assess the use of tactical elements (individual or collective/cooperative and oppositional) in game situations	4.53 ± 1.18	4.41 ± 1.17	.256
I assess the application of the rules (knowledge, applications, use, etc.) in game situations	4.35 ± 1.24	4.46 ± 1.14	.612
I assess the physical fitness of the student	3.69 ± 1.41	3.93 ± 1.52	.058
I assess motor problem solving (basic, specific, sporting, etc. motor skills and abilities)	5.01 ± 1.06	4.97 ± 1.02	.552
I assess students' ability to make artistic and expressive creations	5.02 ± 1.10	4.47 ± 1.02	**.003***
I assess the execution of dance techniques and/or dances	4.23 ± 1.32	4.25 ± 1.32	.969
I assess students' ability to carry out activities in the natural environment	4.41 ± 1.27	4.03 ± 1.38	**.004***
I assess whether students know and respect health and hygiene habits in the practice of physical activity	5.25 ± 1.05	4.96 ± 1.19	**.018***
Assessment tools			
Observation sheet	4.81 ± 1.10	4.57 ± 1.25	.092
Rubrics	4.58 ± 1.42	4.05 ± 1.73	**.009***
Exam	2.80 ± 1.53	2.97 ± 1.76	.532
Motor tests	2.54 ± 1.57	3.08 ± 1.75	**.004***
Psychomotor skills test	2.34 ± 1.53	2.97 ± 1.68	**.000****
Contextualised game situations	4.79 ± 1.23	5.05 ± 0.94	.149
Physical fitness test	2.91 ± 1.57	3.45 ± 1.75	**.004***

Note. Statistically significant differences are in **bold:** *p < .05 **p < .001.

Table 6 shows the differences according to the highest academic degree obtained. With regard to the assessment aspects of students' motor skills, only the item assessing the students' ability to make artistic and expressive creations shows statistically significant differences between teachers with undergraduate and postgraduate training, the latter presenting the highest mean values (p = .002; 4.82 ± 1.12 vs. 5.09 ± 1.04). In relation to the use of assessment tools according to the highest academic degree of the teachers, statistically significant differences appear in 4 of the 7 items analysed. Teachers with postgraduate studies exhibit higher mean values in the use of: (i) rubrics (p = .003; 4.25 ± 1.55 vs. 4.64 ± 1.46); (ii) exams (p < .001; 2.51 ± 1.52 vs. 3.15 ± 1.59); and (iii) physical fitness tests (p < .001; 2.74 ± 1.56 vs. 3.33 ± 1.65). Regarding motor skills tests, it is the teachers with undergraduate studies who exhibit the highest mean values (p = .043; 2.66 ± 1.64 vs. 2.34 ± 1.53).

Table 6
Differences in the assessment aspects of students' motor skills and the assessment tools used according to the highest academic grade obtained.

	Degree	Postgraduate	
	M ± SD	M ± SD	
n,	220	235	*p*
Assessment aspects of motor skills			
I assess the correct technical execution (gestures, forms specific to each sport modality) of sport skills	4.01 ± 1.38	4.24 ± 1-27	.094
I assess the use of tactical elements (individual or collective/cooperative and oppositional) in game situations	4.40 ± 1.20	4.60 ± 1.15	.106
I assess the application of the rules (knowledge, applications, use, etc.) in game situations	4.34 ± 1.16	4.41 ± 1.27	.291
I assess the physical fitness of the student	3.71 ± 1.39	3.77 ± 1.50	.616
I assess motor problem solving (basic, specific, sporting, etc. motor skills and abilities)	4.99 ± 1.09	5.02 ± 1.01	.988
I assess students' ability to make artistic and expressive creations	4.82 ± 1.12	5.09 ± 1.04	**.002***
I assess the execution of dance techniques and/or dances	4.20 ± 1.31	4.27 ± 1.33	.541
I assess students' ability to carry out activities in the natural environment	4.28 ± 1.31	4.36 ± 1.31	.444
I assess whether students know and respect health and hygiene habits in the practice of physical activity	5.12 ± 1.15	5.23 ± 1.02	.464
Assessment tools			
Observation sheet	4.77 ± 1.12	4.74 ± 1.17	.942
Rubrics	4.25 ± 1.55	4.64 ± 1.46	**.003***
Exam	2.51 ± 1.52	3.15 ± 1.59	**.000****
Motor tests	2.64 ± 1.62	2.70 ± 1.64	.674
Psychomotor skills test	2.66 ± 1.64	2.34 ± 1.53	**.043***
Contextualised game situations	4.77 ± 1.23	4.93 ± 1.11	.213
Physical fitness test	2.74 ± 1.56	3.33 ± 1.65	**.000****

Note. Statistically significant differences are in **bold:** *p < .05 **p < .001.

Table 7
Relationship between the assessment aspects of students' motor skills and the assessment tools used.

	Observation Sheet	Rubrics	Exam	Motor Tests	Psychomotor Tests	Contextualised game situations	Physical Fitness Test
I assess the correct technical execution (gestures, forms specific to each sport modality) of sport skills	-.007	**.122***	**.306****	**.190****	**.150***	**.108***	**.285****
I assess the use of tactical elements (individual or collective/cooperative and oppositional) in game situations	**.130***	**.195****	.086	**.137***	.088	**.219****	**.156***
I assess the application of the rules (knowledge, applications, use, etc.) in game situations	**.147***	**.203****	**.154***	**.134***	.070	**.224****	**.140***
I assess the physical fitness of the student	**.101***	.035	**.255****	**.343****	**.300****	**.159***	**.519****
I assess motor problem solving (basic, specific, sporting, etc. motor skills and abilities)	**.131***	**.170****	.028	**.091***	**.108***	**.192****	.023
I assess students' ability to make artistic and expressive creations	**.113***	**.296****	.068	.061	.022	.080	.068
I assess the execution of dance techniques and/or dances	.065	.054	**.170***	**.193***	**.159***	.054	**.215****
I assess students' ability to carry out activities in the natural environment	**.124***	**.201****	.062	.082	.049	.004	.075
I assess whether students know and respect health and hygiene habits in the practice of physical activity	**.162****	**.256****	-.046	.051	.013	.052	-.011

Note. Statistically significant differences are in **bold:** *$p < .05$ **$p < .001$.

Table 7 shows the relationship between the assessment tools used and the assessment aspects of students' motor skills. Although there are quite a few relationships between the items investigated, they are weak ($r < .200$). Those with the highest values among the items studied are highlighted here. In the case of rubrics, the relationship when assessing the students' ability to make artistic and expressive creations stands out ($r = .296$; $p < .001$). Exams are positively related to assessing the correct technical execution of sport skills ($r = .306$; $p < .001$) and motor and psychomotor tests are positively related to assessing students' physical fitness ($r = .343$ and $r = .300$, respectively; $p < .001$). Contextualised game situations are related to assessing the use of tactical elements in game situations ($r = 219$; $p < .001$) and assessing the application of rules in game situations ($r = .224$; $p < .001$). Finally, physical fitness tests have a strong and positive relationship with assessing students' physical fitness ($r = .519$; $p < .001$).

Discussion

This research aims: (i) to analyse the most and least valued variables in relation to the assessment aspects of students' motor skills and the type of assessment tools used by PE teachers; (ii) to assess whether there are statistically significant differences in these aspects among Primary and Secondary school teachers, according to teaching experience, according to the highest academic degree obtained and the type of school in which they teach; and (iii) to assess the relationship between the assessment tools

used and the aspects that are assessed in relation to student motor skills. With regard to the first objective, the results of this research show that the elements with the highest average values in the assessment aspects of students' motor skills are "to assess whether students know and respect health and hygiene habits in the practice of physical activity and motor problem solving" and the least valued "to assess the state of students' physical fitness". This shows a change in perspective with respect to what has traditionally been considered the most important value in the area. This is consistent with the study by Cañadas & Santos-Pastor (2021) and Chaverra-Fernández & Hernández-Álvarez (2019a), where it is evident that teachers are giving less and less importance to the measurement of physical fitness. In relation to the use of assessment tools, those reported as the most used are contextualised game situations and observation sheets, and the least used are psychomotor tests, thereby abandoning traditional physical fitness tests, and giving way to new assessment tools to assess students' motor skills and learning, as has been shown in previous studies (Chaverra & Hernández-Álvarez, 2019b).

In relation to the second objective, in the assessment aspects of students' motor skills, it can be seen that work on sports technique, physical fitness and artistic creations are assessed more frequently in Secondary Education. This is in line with the type of knowledge that should be developed at this stage of education and which is given much less importance in Primary Education within the curriculum (Royal Decree 157/2022; Royal Decree 217/2022). On the other hand, less experienced teachers tend to assess aspects related to sport tactics, rules, motor problem solving, the creation of expressive activities and carrying out activities in the natural environment more frequently. This may be because they have received different initial training, focused on the practical rationality of PE, and which places more importance on working on all curricular content, and therefore on its assessment (Hortigüela-Alcalá & Pérez-Pueyo, 2016; López-Pastor & Gea-Fernández, 2010). In the case of school ownership, public school teachers most frequently assess the production of artistic creations, carrying out activities in the natural environment and respecting and maintaining health and physical activity habits. In private schools, physical fitness, motor and psychomotor tests are used to a greater extent. As Flores et al. (2008) point out, this may be linked to the fact that in private schools education is more elitist in nature, placing greater importance on performance and the assessment of students' effectiveness in the proposed tasks.

On the other hand, with regard to assessment tools, physical fitness tests and examinations are most frequently used in secondary education. This higher incidence of use of assessment tools related to measurement may indicate an academicist view and a performance perspective associated with increasing demands in PE as one progresses through the grades and levels of education (Holfelder & Schott, 2014; Fisette & Franck, 2013; Sicilia et al., 2006). However, at both levels of education, the results highlight the importance of the assessment of procedural and attitudinal content. For the assessment of these, the most commonly used tools include observation sheets and rubrics. These results are in line with those produced in research carried out by Sicilia et al. (2006), which highlights the use of observation to assess attitudinal and procedural learning as the tool most commonly used by PE teachers. Similarly, Chaverra (2014; 2019a) highlights that teachers use qualitative assessment tools such as rubrics, observation sheets, field diaries, etc., to keep a record of the activities that take place in their classes, highlighting the need to prioritise attitudes as a means of comprehensive training and not to overvalue the technical elements of the field.

Less experienced teachers make more use of rubrics and contextualised game situations, while more experienced teachers make more use of tests. As López-Pastor and Pérez-Pueyo (2017) conclude, this may be due to the influence of the summative tradition of assessment, automatism and the reproduction of assessment practices experienced during the student stage. However, Chaverra (2014) finds that as teachers become more experienced and reflect more on their assessment practice, they are more inclined to use formative tools. Thus, he concludes that professional experience and reflection on one's own assessment practice are determining factors in the paradigm shift towards formative assessment.

Finally, with regard to the third objective, there is no clear relationship between the tools used and assessment aspects in PE. Physical fitness tests have a strong and positive relationship with the assessment of students' physical fitness, and it is clear that, although there has been progress in the assessment tools used, in the case of physical fitness assessment it continues to be one of

the most widely used resources. On the other hand, the relationship between the use of rubrics and assessment of students' ability to produce artistic and expressive creations stands out, and this tool is becoming an increasingly used resource, especially for those contents that are more difficult to assess (Pérez-Pueyo et al., 2019). Contextualised game situations are related to assessing the use of tactical elements as well as assessing the application of the rules in game situations, showing the coherence for teachers to assess in the same way as this content has been previously worked on.

Conclusions

This study has shown that, among the assessment aspects of students' motor skills, teachers report giving greater importance to assessing whether studentsknow and respect health and hygiene habits in the practice of physical activity and motor problem solving, the least valued aspect being the assessment of students' physical fitness. In terms of assessment tools, teachers indicate that the most frequently used are contextualised game situations and observation sheets, with tests being the least frequently used. There are some differences in these aspects depending on the educational level, teaching experience, academic degree and ownership of the school, although they are not constant and in many cases coincide with the logic of training that students should receive at each educational level or having received more up-to-date training. Finally, there is no clear relationship between most of the assessment tools studied and the motor skill assessment aspects; however, the use of tests to assess physical fitness and contextualised game situations for the assessment of tactics and sporting rules do stand out.

Among the strengths of this research is the large sample of Spanish PE teachers, as well as the innovation of the research itself, investigating aspects that have not previously been researched in depth. On the other hand, it has certain limitations, such as those inherent to quantitative research, since it cannot analyse the reasons for certain situations or the fact that it does not include the conceptual and attitudinal aspects that also form part of student assessment. In future lines of research, it is necessary to broaden research on this subject, extending the sample within the Spanish context and to other international contexts. In addition, it is necessary to analyse the reasons that lead teachers to assess certain aspects or to use certain types of tools.

Acknowledgements

Predoctoral contract FPI-UAM of Maite Zubillaga-Olague, Faculty of Teacher Training and Education, Autonomous University of Madrid. This article is part of Laura Cañadas' postdoctoral research stay funded by the UAM-Santander Call for the mobility of young researchers 2021.

References

American Psychological Association (2010). *Publication manual of the American Psychological Association, 6th Ed.* American Psychological Association.

Cañadas, L. & Santos-Pastor, M. L. (2021). La evaluación formativa desde la perspectiva de docentes noveles en las clases de educación física en primaria y secundaria. *Revista Electrónica Educare, 25*(3), 1-20. http://doi.org/10.15359/ree.25-3.25

Cañadas, L., Santos-Pastor, M. L., & Castejón, F. J. (2019). Physical Education Teachers' Competencies and Assessment in Professional Practice. *Apunts Educación Física y Deportes, 139, 33-41.* https://doi.org/10.5672/apunts.2014-0983.es.(2020/1).139.05

Chaverra, B. (2014). Meanings Given to the Assessment of Teaching and Learning. Interpretation from a Group of Physical Education Teachers. *Estudios Pedagógicos, 40*(2), 65-82. https://doi.org/10.4067/S0718-07052014000300004

Chaverra, B. & Hernández-Álvarez, J.L. (2019a). The Planning of Assessment in Physical Education: Case Study on Ignored Process in Teaching. *Revista Electrónica Educare, 23*(1), 1-21. https://doi.org/10.15359/ree.23-1.12

Chaverra, B. & Hernández-Álvarez, J.L. (2019b). La acción evaluativa en profesores de educación física: Una investigación multi-casos. *Revista Iberoamericana de Evaluación Educativa*, *12*(1), 211-228. https://doi.org/10.15366/riee2019.12.1.012

Chng, L. S. & Lund, J. (2018). Assessment for Learning in Physical Education: The What, Why and How. *Journal of Physical Education, Recreation & Dance, 89*(8), 29-34. https://doi.org/10.1080/07303084.2018.1503119

Chróinín, D. & Cosgrave, C. (2013). Implementing formative assessment in primary physical education: teacher perspectives and experiences. *Physical Education and Sport Pedagogy, 18*(2), 219-233. https://doi.org/10.1080/17408989.2012.666787

Fisette, J. & Franck, M. D. (2013). How teachers can use PE metrics for formative assessment. *Journal of Physical Education, Recreation & Dance, 83*(5), 23-34. https://doi.org/10.1080/07303084.2012.10598775

Flores, J., Salguero, A. & Márquez, S. (2008). Relación de género, curso y tipo de colegio con el clima motivacional percibido en la Educación Física escolar en estudiantes colombianos. *Revista de Educación, 347*, 203-227.

Herrán, I., Heras, C. & Pérez-Pueyo, Á. (2019). La evaluación formativa. El mito de las rúbricas. Alternativas en la elaboración de instrumentos de evaluación en secundaria. *Infancia, Educación y Aprendizaje, 5*(2), 601-609.

Holfelder, B. & Schott, N. (2014). Relationship of fundamental movement skill and physical activity in children and adolescents: A systematic review. *Psychology of Sport and Exercise, 15*, 382-391. https://doi.org/10.1016/j.psychsport.2014.03.005

Hortigüela-Alcalá, D. & Pérez-Pueyo, A. (2016). Perception of Students in Physical Education Classes in Connection with other Subjects. *Apunts Educación Física y Deportes, 123*, 44-52. http://dx.doi.org/10.5672/apunts.2014-0983.es.(2016/1).123.05

James, A. R., Griffin, L. L. & France, T. (2005). Perception of assessment in elementary physical education: A case study. *Physical Educator, 62*(2). 85-95.

Ley Orgánica 3/2020, de 29 de diciembre, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación. *Boletín Oficial del Estado 340*, de 30 de diciembre de 2020, 122868-122953.

López-Pastor, V. M. & Gea Fernández, J. M. (2010). Innovation, discourse & rationality in physical education. review and prospective. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte*, *10*(38), 245-270. Http://cdeporte.rediris.es/revista/revista38/artinnovacion154.htm

López-Pastor, V. M., Kirk, D., Lorente-Catalán, E., MacPhail, A., & Macdonald, D. (2013). Alternative assessment in physical education: a review of international literature. *Sport, Education and Society, 18*(1), 57-76. https://doi.org/10.1080/13573322.2012.713860

López-Pastor, V. M., & Pérez-Pueyo, A. (Coords.) (2017). *Evaluación formativa y compartida en educación experiencias de éxito en todas las etapas educativas.* León: Universidad de León.

MacPhail, A., & F. Murphy. (2017). Too Much Freedom and Autonomy in the Enactment of Assessment? Assessment in Physical Education in Ireland. *Irish Educational Studies 36*(2), 237-252. https://doi.org/10.1080/03323315.2017.1327365

Moura, A., Graça, A., MacPhail, A., & Batista, P. (2021). Aligning the principles of assessment for learning to learning in physical education: A review of literature. *Physical Education and Sport Pedagogy, 26*(4), 388-401. https://doi.org/10.1080/17408989.2020.1834528

Otero, F. & González, J. A. (2016). Evaluar para aprender y calificar: experiencia en educación física con el instrumento de evaluación para el aprendizaje de situaciones de invasión. *EmásF. Revista Digital de Educación Física, 7*(41), 143-155.

Pérez-Pueyo, A., Hortigüela-Alcalá, D., & Gutiérrez-García, D. (2019). La evaluación del alumnado: tan cotidiana y, sin embargo, tan mejorable. La necesidad de nuevos instrumentos. *Cuadernos de Pedagogía*, *504*, 55-63.

Real Decreto 157/2022, de 1 de marzo, por el que se establecen la ordenación y las enseñanzas mínimas de la Educación Primaria. *Boletín Oficial del Estado 52*, de 2 de marzo de 2022, 2022-3296.

Real Decreto 217/2022, de 29 de marzo, por el que se establecen la ordenación y las enseñanzas mínimas de la Educación Secundaria Obligatoria. *Boletín Oficial del Estado 76*, de 30 de marzo de 2022, 2022-4975.

Rodríguez-Negro, J., & Zulaika, L. M. (2016). Evaluación en Educación Física. Análisis comparativo entre la teoría oficial y la praxis cotidiana. *Sportis. Revista técnico- Científica del Deporte Escolar, Educación Física y Psicomotricidad, 2*(3), 421-438. http://dx.doi.org/10.17979/sportis.2016.2.3.1448

Secchi, D. J., Garcia, C. G. & Acuri, C. R. (2016). ¿Evaluar la condición física en la escuela? Conceptos y discusiones planteadas en el ámbito de la educación física y la ciencia. *Enfoques, 28*(1), 67-92.

Sicilia, A., Delgado, M. A., Sáenz-López, P., Manzano, J. L., Varela, R., Cañadas, J. F. & Gutiérrez, M. (2006). La evaluación de aprendizajes en educación física. Diferencias en función del nivel educativo. *Motricidad. European Journal of Human Movement, 17*, 71-93.

Zubillaga-Olague, M., & Cañadas, L. (2021). Design and validation of "#EvalEF" questionnaire to value assessment processes developed by physical education teacher. *Retos, 42*, 47-55. https://doi.org/10.47197/retos.v42i0.86627

Conflict of Interests: No conflict of interest was reported by the authors.