

Construction and internal validation of a Cooperative Games Questionnaire

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Abstract

This study presents the results of construction and internal validation of a research instrument titled Cooperative Games Questionnaire (CGQ)¹. The study combined qualitative and quantitative procedures and was based on six sequential steps. The literature survey revealed the need to construct a research instrument focused on teaching knowledge. The analytical matrix allowed the inclusion of the organized research dimensions in the instrument. The focus group allowed to select questions relevant to the instrument. The evaluation by examiners allowed to identify the correct arrangement of the contents. The applicability of the CGQ allowed to determine whether the questions of the instrument were understandable, and the test allowed to determine its internal consistency. The CGQ has content and semantic validation, showing significant reliability. It is recommended that the instrument be administered to a large number of participants for performing external validation.

Keywords: cooperative games; Physical Education; research instrument; construction and internal validation; Cooperative Games Questionnaire (CGQ).

¹ CGQ: Cooperative Games Questionnaire

1. INTRODUCTION

Cooperative games can be defined as practices to be carried out aiming at a common purpose or several complementary ones (Velázquez, 2012), with shared actions and attitudes that unite, awaken, encourage, and guide the participants' attention to the process, reducing performance-induced stress and contributing to the sensation of pleasure during the context experienced (Palmieri, 2015; Almeida, 2010; Correia, 2006; 2007; Soler, 2003; Brotto, 2000). The main focus of cooperative games is to provide opportunities for cooperative learning in fun interactive contexts (Orlick, 1989). Recent research has shown that the pedagogical practice of cooperative games contributes positively to the motivation of participants (Navarro-Patón, Basanta-Camiño, & Abelairas-Gómez, 2017), as well as to more participatory behaviors (Creighton & Szymkowiak, 2013; Latisha, 2014), less aggressiveness (Ferriz Valero, García Martínez, & Arroyo Botella, 2019), and more empathy (Latisha, 2014; Palmieri, 2015), reducing bullying behaviors among peers (Oliveira et al., 2017) and favoring the learning process (Alencar et al., 2019) during social interaction and interaction activities (Ferriz Valero et al., 2019; Silva et al., 2012) when observed in an educational context.

Cooperative games are included in physical education classes to promote interactive contexts that enable inclusive and meaningful educational processes (Alencar et al., 2019; Silva, 2018; Sikora, Pacheco, Vagetti, & Oliveira, 2017) based on body culture (Alencar et al., 2019; Ministério da Educação e Cultura – Brasil, 1998), stimulating learning and human development in their cognitive, motor, social, and affective aspects (Alencar et al., 2019; Palmieri, 2015; Silva et al., 2012). Cooperative games may trigger reflective processes and the exchange of knowledge and experiences. This makes them an important pedagogical resource for self-knowledge and learning (Orlick, 1989; Brotto, 2000) in terms of content, exchange, and construction of knowledge and behaviors induced by social relationships. However, it is not possible to state with certainty what are the mechanisms that trigger behavioral changes resulting from the practice of cooperative games, as well as whether these changes actually extend beyond the practical context in which the individual was inserted (Lovisoló, Borges, & Muniz, 2013).

Therefore, cooperative games are still considered a controversial topic, being addressed by authors with different views on their forms and theoretical justifications, especially in the competitive environment. Some authors even address cooperative games as a harmful environment and a triggering factor for bad behaviors (Lovisolato et al., 2013). Nevertheless, studies that advocate the use of cooperative games are criticized, as they were characterized, until then, by subjective criteria and results (Natali; Müller, 2009), considering that the generalization of the results of qualitative studies is usually questionable (Sikora, 2016). To date, the absence of large-scale studies and, consequently, of research instruments that allow for the quantification of results, has contributed to the stagnation of the topic, preventing the emergence of new questions and propositions.

Among the main requirements to the construction and validation of a high-quality research instrument are reliability, which is “the ability to reproduce a result consistently, in time and space,” and validity, which refers to “the property of an instrument to measure exactly what is proposed” (Souza, Alexandre, & Guirardello, 2017, p. 649). Different processes can be adopted to verify the validity and reliability of an instrument (Cohen, Swerdlik, & Sturman, 2014; Hutz, Bandeira, & Trentini, 2017; Szeremeta, 2018). Multiple instruments can be implemented in the validation (Pasquali, 2017), from which we can highlight those aimed at determining whether the “content is correct and adequate to what it proposes”, being used by specialists in the area and semantic validation, which aims at “determining whether all items were understood by the members to whom the material is intended” (Ribeiro, Oliveira, Moreira, & de Paula, 2017, p. 3). Reliability, in turn, can be obtained by internal consistency and reveals whether all questions for each variable of the instrument measure the same proposed characteristic (Souza et al., 2017).

Given the above, this study aimed to construct and internal validate a research instrument titled Cooperative Games Questionnaire (CGQ).

2. METHODOLOGY

The development of research instruments requires the use of theoretical, empirical, and analytical processes (Pasquali, 2010). Accordingly, this mixed-methods, exploratory, descriptive, and

correlational study adopted qualitative and quantitative methods in the construction and internal validation of the CGQ (Sampieri, Collado, & Lucio, 2013).

The construction and internal validation of the CGQ included six steps: 1) literature survey; 2) construction of an analytical matrix with research questions to be included; 3) formulation of problem questions; 4) conduction of a focus group; 5) evaluation of the instrument by specialist examiners; and 6) conduction of a pilot study. The literature survey aimed to support the construction of the questionnaire by establishing a theoretical framework, while the focus group and the evaluation by examiners determined the content validation and the pilot study established the semantic validation and determined the reliability of the instrument.

Two different processes were used for content validation: the conduction of a focus group and the evaluation by examiners. Five physical education teachers working at different educational levels and modalities in the State of Paraná, Brazil, were intentionally selected. These professors taught in elementary, middle, and high schools, as well as in higher and special education. Three specialists, PhDs, and university professors were evaluated by examiners. In the semantic validation, carried out through a pilot study, the semantic validation form was administered to 15 middle-school physical education teachers at municipal schools in the city of Curitiba, in the State of Paraná, Brazil. Along with the semantic validation, the CGQ test was performed to determine the reliability of the instrument, as the sampling was representative of the population, which, in that time, was 37 teachers.

The inclusion criterion for the six steps of the study was acceptance of participation, while the exclusion criterion was non-acceptance or withdrawal from participation in the research.

The literature survey was conducted using databases such as Eric, SciELO, Redalyc, Web of Science, Scopus, and Capes Portal. This step aimed to identify the structure and dimensions of the topic to be used in the construction of the analytical matrix, which later guided the construction of the instrument. The search used an analytical matrix (Oliveira, 2007), which was structured based on the objectives, categories, indicators, information, and questions to be included in the study. Considering the perspective of diagnostic investigation, the parameters of the analytical matrix were based on the physical

education teachers' knowledge of cooperative games, since it would be necessary to identify information from those who implement the pedagogically in the Brazilian educational scenario to understand the reality of the topic and, thus, justify possible results.

After selecting the research dimensions and the preliminary structure of the questionnaire based on the analytical matrix, refinement began, followed by sequential stages and under different perspectives in which the questions were modified or excluded according to internal and external criteria, following ethical and care principles described in the opinion approved by the Research Ethics Committee (CEP/SD) of the Health Sciences Sector at UFPR, under number 980964 of 03/11/2015, to which the project was submitted.

Content validation is defined as the determination of content adequacy to what it proposes to investigate (Pasquali, 2010). Two focus group sessions were held every 15 days to define the core and focus of the questionnaire and, thus, start the validation of the CGQ. The focus group sessions were recorded in audio and video using a digital recorder, which was placed in the central position of a semicircle, and a video camera positioned behind the moderator, to capture the image of all participants. The room was set and the participants took their seats. After the moderator's explanations, the focus group started with the presentation of problem questions to incite a debate among the participants. The researcher proposed guiding questions defined a priori based on the scientific references listed in a semi-structured questionnaire derived from the analytical matrix. She also showed videos of cooperative games to motivate participants to debate the subject and, thus, obtain information from their speeches and behaviors.

During the focus group, aspects relevant to data analysis were observed and noted. Inferences and observations were collected and then transcribed using pseudonyms for the participants. Subsequently, the notes were analyzed and used in the reformulations of the CGQ. After transcribing the results of the focus group, the content of the inferences and notes were analyzed (Bardin, 2011) by the differential method of categories. This method included pre-analysis (performed using the full transcription of the speeches and observations and the organization and selection of indicators representative of the information obtained), exploration of the material (in which the inferences were coded in record units composed of keywords) and

treatment of the results were treated, with the interpretation and categorization of information for the research dimensions of the CGQ. Focus group analysis followed four criteria: relevance of the statements of the research questions in the questionnaire, research purposes, belonging of the questions to their respective categories, and the need to exclude or adjust items due to similarity. After the focus group analysis, the CGQ preview was reformulated and the validation process started. To this end, two forms were used: one for content validation and one for semantic validation.

The content validation form was sent by e-mail to be answered within seven days, and each question of the instrument should be classified according to its respective category. The purpose of the form was to determine whether the questions actually belonged to their previously assigned categories. Each question should receive at least one expected classification so that it can remain linked to its previously determined category. Otherwise, it should be modified or excluded from the instrument. For this stage of the research, 24 university professors specialized in the field were invited by e-mail to act as examiners; however, only three signed the consent form accepting to participate in the research.

The Kappa (K) coefficient was applied to data from the Content Analysis Forms using the SPSS program version 24 for Windows to determine the specialists' agreement on the CGQ questions. This coefficient was developed as a procedure capable of calculating the fidelity of an instrument (Cohen, 1960), being representative of the agreement between examiners (Fonseca, Silva, & Silva, 2007), corresponding to "the ratio of the proportion of the times that the examiners agree (corrected by agreement due to chance) with the maximum proportion of times that the examiners could agree "corrected by agreement due to chance" (Alexandre; Coluci, 2011, p. 3066), corroborating Siegel and Castellan, (2006) and Hulley, Cummings, Browner, Grady, and Newman (2003). As it is a measure of agreement for categorical variables, K is used when there is agreement between two or more examiners evaluating N objects. Although there are several versions of the Kappa statistic, the generalized Kappa form for K examiners was used in this study (Cohen, 1960; Siegel & Castellan, 2006). There is no consensus in the literature regarding Kappa values (Matos, 2014), with K values <0.4 being sometimes considered poor, $K = 0.4 \leq 0.75$ ranging from satisfactory to good, and $K \geq$

0.75 considered excellent (Fleiss, 1981). There are also reports of $K < 0$ without agreement; $0 \leq K < 0.21$: with a slight agreement; $0.21 \leq K < 0.41$: with weak agreement; $0.41 \leq K < 0.61$: moderate; $0.61 \leq K < 0.81$: significant; and $0.81 \leq K \leq 1.00$: almost perfect agreement (Landis; Koch, 1977).

After identifying the modifications from the content form, the semantic validation form was prepared to be administered to the same examiners and under the same conditions. To correct any inconsistencies between the questions and their respective categories, the semantic analysis form was prepared using dichotomous variables (yes/no) for each question for the criteria of simplicity, ease of reading, adequate vocabulary, objectivity, and need for adaptation of the items. The form also contained a field for comments, in case the examiner wanted to leave a comment or suggest the exclusion of one of the questions.

In order to analyze the semantic validation form and, consequently, the specialists' agreement on the criteria above, the percentage of absolute agreement was chosen. This is a simple technique aimed at "calculating the number of times examiners agree and dividing it by the total number of evaluations" (Matos, 2014, p. 304), with results ranging from 0% to 100%, that is, the percentage applied to the number of observed agreements divided by the number of expected agreements (Shweta, Bajpai, & Chaturvedi, 2015). After reaching an agreement, the examiners defined the questions that should be changed and how they should be modified using a semantic validation form. Then, the CGQ was changed based on these directions, and the validation process started with the construction of the respective form along with the pilot study with the administration of the instrument test.

To carry out the internal validation, schools in Curitiba's municipal education system were contacted by phone and personal visit. Dates and times were scheduled for the presentation of the project to physical education teachers. The CGQ, the semantic validation form, and a pen for filling in were given to those who agreed to participate in the research. Participants were asked to answer the questionnaire and fill out the form in one of the classrooms, provided it was unoccupied, airy, quiet, and with good lighting. On the same day, the questionnaire was answered and collected. Subsequently, the data in the semantic validation form were tabulated and analyzed as to the need for

corrections to the CGQ, as to the criteria of simplicity, ease of reading, adequate vocabulary, objectivity, and need for adaptation of the items. Unlike the semantic validation form assessed by examiners, this form assesses each criterion using a five-point Likert scale, and the respondent can choose to “strongly disagree,” “disagree,” “neither agree nor disagree,” “agree,” and “strongly agree.”

The CGQ was administered along with the pilot study. Because of the size of the research sample, it was decided not to use factor analysis due to the sample size, since 10 participants are recommended per item of the instrument (Pasquali, 2010). Subsequently, the test data were subjected to analysis of the internal consistency of the instrument in SPSS using Cronbach’s alpha values as a parameter, as described in Table 1.

Table 1. Cronbach’s alpha – reference parameters

Cronbach's alpha value	Internal consistency
>0.80	Almost perfect
from 0.61 to 0.80	Significant
from 0.41 to 0.60	Moderate
from 0.21 to 0.40	Reasonable
<0.21	Small

Source: Landis e Koch (1977).

3. RESULTS

3.1. Theoretical framework

Since studies that address the construction of instruments with psychometric variables, that is, related to subjective variables that cannot be obtained directly, often use the Likert scale (Alana & Kabasakal, 2020; Szeremeta, 2018; Curado, Teles, & Marôco, 2014;), this study structured the questionnaire using a Likert five-point scale. The literature survey showed that the topic of cooperative games has limited and not far-reaching aspects when applied to the educational sector, mainly in the context of physical education in Schools. Despite the significant contributions, the predominance of qualitative and literature review studies prevents generalizations and makes it impossible to determine the real dimension of the topic in educational contexts. Therefore, it is necessary to diagnose the pedagogical reality of cooperative games, starting with the identification of the main agents responsible for implementing cooperative games in teaching-

learning processes, which are the physical education teachers, in order to outline an overview in line with the situation. Therefore, the main focus of the investigation must be knowledge.

One needs to investigate the different contexts in which teachers can come across cooperative games in order to understand the extent of their knowledge about them. Considering knowledge as a complex and subjective process, this study was based on the teacher's perception. Accordingly, 10 research categories were created to determine the teacher's contact or intent to explore the topic of cooperative games: initial training, professional qualification, conceptual knowledge, mastered knowledge, knowledge taught, influencing cognitive factors, cognitive purposes and objectives, socializing objectives, affective objectives, and motor objectives.

The theoretical framework guided the construction of the questionnaire because, in addition to helping identify the gap in the study in the absence of a quantitative instrument for investigating cooperative games, it guided the objectives of the CGQ, directing them towards the perception of the teaching knowledge of cooperative games.

3.2. Focus group

The participants had different views on pedagogical concepts and different pedagogical intentions with cooperative games. Some guiding questions proved to be more interesting and conflicting during the debate, while others were not aligned with the purposes of the study. During the debate, most of the questions corresponded to their respective categories, and the same meaning was attributed to the questions hitherto differentiated in the instrument. After the focus group was analyzed, 35 questions were excluded, and others that were previously distributed in the categories related to accumulated knowledge of cooperative games (concept, mastery, and education) were grouped by similarity in order to constitute a unified category of accumulated knowledge of cooperative games. These modifications contributed to content validation and resulted in the CGQ preview, with 65 questions being distributed in eight research categories.

3.3. Examiners

Content validation and semantic analysis forms were used for content validation by examiners. The former contained the 65 questions of the CGQ questionnaire that were formulated based on the focus group.

Each examiner classified the questions in the proposed categories according to their understanding. Thus, it was possible to verify their perception on the compatibility of the questions with their categories and to evaluate intra-examiner agreement. Six questions were not classified as expected, 13 had two agreements, and 18 had only one agreement. Of the six questions that did not receive at least one classification in the expected category, three were in the category “influencing factors,” indicating the need to exclude this category. The data obtained from the content analysis form that did not have two agreements in their respective categories are represented in Table 2.

Table 2. Lower frequencies obtained from the content evaluation by the three examiners according to the CGQ.

Questions	CGQ CATEGORIES							
	C1	C2	C3	C4	C5	C6	C7	C8
Q3	1	1		1				
Q10		1		2				
Q14				2	1			
Q16			1			2		
Q17			1				2	
Q18			1					2
Q19			1			1	1	
Q26		1	1	1				
Q27			1		1	1		
Q28			1	1	1			
Q29			1	1				1
Q30			1		2			
Q33			3					
Q36			1	1	1			
Q37			1			1		1
Q40			3					
Q41					1		2	
Q43				2	1			
Q45				1	1	1		
Q49					1	2		
Q56				1		2		
Q59						2	1	
Q62				1	2			
Q63						2		1

Source: Sikora (2016). *Note:* The cells highlighted in grey indicate the expected category.

Data from the content validation form were subjected to the Kappa agreement index, which contains the frequencies of agreement between the three examiners in the questionnaire items in each category *m*, resulting in a kappa agreement of 0.489.

In the semantics analysis, the form with modified questions was used and the category “accumulated knowledge of cooperative games – influencing factors” was excluded from the instrument, totaling 55 questions to be analyzed by the examiners, who classified the questions based on five criteria: simplicity, ease of reading, adequate vocabulary, objectivity, and need for adaptation of the items. The classifications revealed that, of the 55 questions evaluated, 10 showed disagreements between specialists, while only seven were indicated for adjustments (Q15, Q18, Q19, Q20, Q27, Q36 and Q52) by one of the examiners, as shown in Table 3.

Table 3. Frequency of “disagreements” obtained with the semantic analysis of the three examiners.

Questions	SEMANTICS									
	Simplicity		Ease of reading		Proper vocabulary		Objectivity		Need for adaptation	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Q15	2	1	3		3		2	1	1	2
Q18	2	1	3		3		2	1	1	2
Q19	2	1	3		3		2	1	1	2
Q20	2	1	3		3		2	1	1	2
Q27	3		3		3		1	2	1	2
Q28	3		3		3		2	1		3
Q29	3		3		3		2	1		3
Q30	3		3		3		2	1		3
Q36	3		3		2	1	2	1	1	2
Q52	3		2	1	3		2	1	1	2

Source: Sikora (2016). *Note:* The cells highlighted in grey indicate the expected category.

When applying the percentage of absolute agreement, the category “accumulated knowledge” obtained the lowest levels of agreement, presenting 93.3% in simplicity, 100% in ease of reading, 100% in appropriate vocabulary, 85% in objectivity, and 91.6% in need for adaptation of the items.

3.4. Pilot study

For semantic validation, the semantic validation form was administered, which differed from the semantic analysis form because it allowed for multiple answers to the items as to five criteria: simplicity, ease of reading, adequate vocabulary, objectivity, and need for adaptation of the items. The form was to be answered according to a five-point Likert scale including “strongly disagree,” “disagree,” “neither agree nor disagree,” “agree,” and “strongly agree.” Fourteen

respondents participated in the process of semantic validation, strongly agreeing with all items of the questionnaire as to the five criteria above. Only one respondent gave different answers to some of the questions regarding the above criteria. Thus, the questions were simple (as reported by 100% of respondents), easy to read (100%), with adequate vocabulary (95.4%), objective (100%), and did not need adaptation (93.8%).

A test was performed on a representative sample of the population to determine the reliability of the instrument, and the results were obtained when determining the internal consistency by Cronbach’s alpha (Table 4).

Table 4. Internal consistency of the CGQ categories.

Internal Consistency Statistics			
Group	Cronbach's alpha	95% lower confidence limit	No. of items
Total	0.7892	-	55
Q1 – Q5	0.7891	0.605100	05
Q6 – Q10	0.6794	0.339960	05
Q11 – Q30	0.7609	0.586600	20
Q31 – Q40	0.8208	0.682600	10
Q41 – Q45	0.8262	0.674500	05
Q46 – Q50	0.5929	0.237800	05
Q51 – Q55	0.6680	0.378200	05

SOURCE: Sikora (2016).

3.4. Final CGQ

After this process, the final CGQ instrument was obtained, as shown in Table 6.

Cooperative Games Questionnaire

- 1 - Name: _____
- 2 - Mark with an X, from 1 (strongly disagree) to 5 (strongly agree) according to your opinion on the following statements regarding your training and your understanding of the purposes of cooperative Games:

Table 5. Likert scale

1	2	3	4	5
Strongly disagree	I disagree	I do not agree nor disagree	I agree	Strongly agree

Note: The space corresponding to the sum of the items (TOTAL) must be filled by the researcher.

Table 6. Final CGQ.

Initial training in cooperative games	1	2	3	4	5
The topic of cooperative games was taught during my undergraduate studies and was experienced by me.					
My undergraduate studies allowed me to assimilate theoretical concepts about cooperative games.					
I received guidance from teachers during my undergraduate studies on didactic-methodological procedures to be used in teaching situations with cooperative games.					
I observed, as an undergraduate trainee, teaching practices with cooperative games.					
The knowledge I have about cooperative games is mostly from my initial academic training.					
TOTAL					
Professional qualification in cooperative games	1	2	3	4	5
I have already received invitations from the institution where I work to participate in training courses on cooperative games.					
The need for inclusive educational practices drives me to look for information on cooperative games, instructional materials, and training courses.					
I feel motivated, in view of the reality of the school, to take part in courses on the topic of cooperative games.					
I participated in training events on cooperative games.					
I use instructional material (such as books, journals, and others digitally available means) on cooperative games in my teaching practice.					
TOTAL					
Accumulated knowledge – mastery and application of cooperative games	1	2	3	4	5
My teaching experience allows me to affirm that I have knowledge about cooperative games.					
I have no doubt about the purpose of the different categories and subcategories of cooperative games, classified as: <u>cooperative games without losers/cooperative games of collective result/ cooperative games of inversion</u> – (inversion with rotation, inversion of scorer, score inversion, and total inversion), and <u>semi-cooperative games</u> .					
I am able to conceptualize (explain the objectives and the organizational form) each of the categories and subcategories of cooperative games, (<u>cooperative games without losers/ cooperative games of collective result/ cooperative games of inversion</u> – [Subcategory: inversion with rotation, inversion of scorer, score inversion, and total inversion], and <u>semi-cooperative games</u>).					
In the pedagogical practice with cooperative games, it is expected that the student's knowledge can evolve through the intervention of the others.					
Cooperative games can be applied with an emphasis on the cognitive development of students.					
Cooperative games can be applied with an emphasis on the social development of students.					
Cooperative games can be applied with an emphasis on the affective development of students.					
Cooperative games can be applied with an emphasis on the motor development of students.					
Cooperative games can be applied with an emphasis on the development of moral among students.					

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Cooperative games can be applied with an emphasis on the integral development of students.					
Cooperative games are present in my teaching practice.					
I use cooperative games in my teaching practice for educational purposes.					
I apply cooperative games in the form of content or methodology in all classes I teach.					
When I work cooperative games with the students, I use all categories.					
I note that cooperative games can contribute to students' learning.					
I understand that cooperative games can be used as a methodology to develop other content, adapting to pre-established objectives.					
I note that students' abilities (physical, social, affective, and cognitive) can be developed during cooperative games.					
In my view, cooperative games create learning possibilities, just as in other types of games.					
My intention when using cooperative games is to enhance students' physical, social, affective, and cognitive abilities.					
I believe that cooperative games require critical reflection and the mediation of a teacher to effectively reach their goals.					
TOTAL					
Purposes of cooperative games – cognitive objectives	1	2	3	4	5
To promote student self-knowledge regarding their emotions.					
To trigger the student's imagination from abstractions emerging from the cooperative context.					
To enable the construction of scientific concepts based on the group's inferences emerging in interactive processes and teaching intervention.					
To make students aware of the existence of different perceptions (ways of thinking) about a phenomenon.					
To stimulate students' attention, making them aware of the cooperative context.					
To instigate the expansion of students' vocabulary, explaining the meaning of expressions and words that can be said in the cooperative context.					
To stimulate the use of the students' memory, making them retrieve assimilated information.					
To allow for the development of cooperative awareness through collective thinking.					
To promote reflection on the individual's relationship with his/her group.					
Develop students' cognitive aspect, regardless of the category or subcategory of the cooperative game used.					
TOTAL					
Purposes of cooperative games – socializing objectives	1	2	3	4	5
To integrate members to the group of students through different arrangement of members in the team.					
To promote the coexistence of differences.					
To develop inclusive collective rules.					
To encourage interaction between students, making them establish communication or contact with each other.					
To develop students' social aspect, regardless of the cooperative game category or subcategory adopted.					
TOTAL					
Purposes of cooperative games – affective objectives	1	2	3	4	5
To allow for collective actions that can motivate students to participate.					
To create empathy for others is the goal of a class using cooperative games.					

To place positive feelings in evidence to the detriment of negative feelings is the goal of a class using cooperative games.					
To encourage group work, regardless of the emotional relationship that students have with each other.					
To develop the affective aspect of the student, regardless of the category or subcategory of the cooperative game used.					
TOTAL					
Purposes of cooperative games – motor objectives	1	2	3	4	5
To allow for the adaptation of motor acts.					
To stimulate the development of specific motor skills.					
To promote the movement of the body with the help of the other.					
To expand the motor repertoire derived from body culture.					
To develop the student’s motor aspect, regardless of the category or subcategory of the cooperative game used.					
TOTAL					

SOURCE: Sikora (2016).

4. DISCUSSION

4.1. Theoretical framework

To determine whether cooperative games were part of teachers’ training and professional qualification, as well as the extent of their knowledge of cooperative games based on concepts, mastery of the practice, and cooperative games as a content developed in the teaching-learning process, and the existence of factors influencing the practice of cooperative games and the actions for the achievement of the pedagogical objectives to be implemented, considering the cognitive, social, affective, and motor aspects based on the literature, research categories were established from which the questions that would make up the CGQ derive. Thus, 10 research categories were defined, each composed of ten questions and structured according to a five-point Likert scale.

The first category of the preliminary CGQ was “initial training in cooperative games,” with questions aimed to identify the presence of content on cooperative games during the undergraduate course in physical education, the way this content was taught, and whether it was significant for the teacher. The second category was “professional qualification in cooperative games,” with questions aimed to identify the availability of courses related to the topic, the participation of teachers in related training, and whether the teacher, during his/her professional practice, sought to specialize in this content, seeking, in some way, to acquire knowledge on the subject. The third category was “accumulated knowledge of cooperative games – concept,” in which the

teacher would recognize him/herself as the holder of knowledge about cooperative games and which covered questions related to the conceptual part of the subject, including its categories and subcategories. The fourth category was “accumulated knowledge of cooperative games – mastery,” which was intended to identify the existence of a pedagogical direction of content for the purposes of use of cooperative games by the teacher. The fifth category was “accumulated knowledge of cooperative games – teaching,” which aimed to identify whether the analyzed topic was effective in teaching practice, its extension, and how it was implemented. The sixth category was “accumulated knowledge of cooperative games – influencing factors,” which aimed to list reasons that would lead the teacher not to use cooperative games as a teaching strategy. The seventh category was “purposes of cooperative games – cognitive objectives,” which investigated the pedagogical scope in the development of students’ knowledge at the time of practice. The eighth category was “purposes of cooperative games – socializing objectives,” which aimed to list situations in which the corresponding aspects could be developed during practice. The ninth category was “purposes of cooperative games – affective objectives,” whose questions were directed to aspects that could be developed in students as a result of the practice. The tenth and last category was “purposes of cooperative games – motor objectives,” which investigated the motor aspect that could be covered during the game.

4.2. Focus group

Although the research dimensions of the CGQ were confirmed by the statements, some questions were more relevant to the discussion than others, making the discussion more directed to certain aspects. Therefore, questions that did not arouse the participants’ interest in the debate were excluded from the questionnaire. It was observed that the participants confused collaborative activities with cooperative ones, repeatedly mentioning activities within this context as belonging to the universe of cooperative games, when, in fact, they were competitive contexts in which interactions involve collaboration, corroborating the objective of the instrument of investigating the teachers’ knowledge of cooperative games. In addition, the participants’ knowledge of cooperative games was demonstrated by the combination of three categories regarding knowledge accumulated of cooperative games

(concept, mastery, and teaching), with conceptual aspects, content mastery, and teaching practices of the topic being inseparable from it. Therefore, these categories were combined into one single category composed by questions related to these three aspects – concept, mastery, and teaching – included in the CGQ as accumulated knowledge of cooperative games. Similar questions were excluded or grouped.

4.3. Examiners

As shown in Table 2, questions Q3, Q10, Q16, Q17, Q18, Q19, Q26, Q27, Q28, Q29, Q30, Q36, Q41, Q43, Q45, Q49, Q59, and Q63 had only one classification in their respective categories, indicating a need for change. In turn, questions Q14, Q33, Q37, Q40, Q56, and Q62 had no classification corresponding to their categories. It was also observed that, of the six questions that did not receive at least one classification in the expected category (Q14, Q33, Q37, Q40, Q56, and Q62), three were in the category “influencing factors” (Q33, Q37 and Q40), suggesting that this category was not aligned with the purposes of the study. It is perceived that these questions could suggest answers based on contexts contrary to the pedagogical practice of cooperative games. Therefore, this category was excluded from the CGQ and the other questions that received a single agreement were modified. After the exclusion, the CGQ remained with 65 questions divided into seven categories.

Kappa agreement, observed in the frequency of agreement between the three examiners in each category *m*, was 0.489. This coefficient indicates a moderate agreement (Siegel & Castellan, 2006) statistically greater than zero (p -value <0.000), showing a significant result of the content of the questions as to their respective categories.

The data obtained by the semantic analysis form (Table 3) revealed that the examiners suggested that questions Q15, Q18, Q19, Q20, Q27, Q36, and Q52 were adapted. Comparing to the data obtained in the content analysis, question Q52, in addition to not having been classified in its corresponding category by any of the specialists in the content analysis form (represented by item Q62 in Table 2), was also indicated for adaptation of the preposition in the semantic analysis form, even though it was changed in the validation form. Questions Q15, Q18, Q19, Q20, Q27, and Q36 were also indicated for content

adaptation in the opinion of the semantic analysis of one of the examiners. Of the 55 questions, 87.7% were considered adequate.

For the percentage to be considered acceptable, the result must be at least 75% and, if it is equal to or greater than 90%, it is considered to indicate a high agreement (Stemler, 2004). When applying the percentage of absolute agreement to the data obtained in the semantics analysis, an agreement of 97.5% was obtained regarding the simplicity of the questions, 99.3% was obtained regarding the ease of reading the questions, 99.3% was obtained regarding the adequate vocabulary of the items, 93.3% was obtained regarding the objectivity of the questions, and 95.7% was obtained regarding the adequacy of the questions.

For content validation, there was a need for changes in questions Q14, Q46 (Q56 in the content analysis form), and Q52 (Q62 in the form), because they were not classified in their respective categories, also in those that received a single classification in the respective category in content analysis. The questions indicated for adaptation, Q15, Q18, Q19, Q20, Q27, and Q36, were adapted in the semantic analysis form. These questions were modified and not excluded at that time because they are relevant as highlighted by the focal group and they have not been indicated for exclusion in the opinions provided by the specialists along with the semantic validation form.

4.4. Pilot study

Fourteen respondents participated in the process of semantic validation, strongly agreeing with all items of the questionnaire regarding the five criteria. Only one respondent gave different answers to some of the questions regarding the above criteria. Thus, the questions are simple (as reported by 100% of the respondents), easy to read (100%), with adequate vocabulary (95.4%), objective (100%), and do not need to be adapted (93.8%).

Regarding reliability, the Cronbach's alpha test obtained an index of 0.7892, which is considered a significant measure and representative of the internal consistency of the instrument as a whole. It is noteworthy that the category of affective objectives (Q46-Q50) showed the lowest value of internal consistency (0.5929), being considered a moderate value. The categories of cognitive objectives

(Q31-Q40) and socializing objectives (Q41-Q45) were classified as almost perfect, as shown in Table 3.

Among the possible reasons why the category of affectivity showed a moderate Alpha index is that it is not yet considered or perceived by the physical education teachers in the pedagogical process (Almeida, 2015). Consequently, this demonstrates the difficulty of recognizing these aspects as present and contributing elements in physical education classes, regardless of the context. In addition, Cronbach's alpha values may be underestimated (Maroco & Garcia-Marques, 2006), meaning that the CGQ instrument can achieve higher values of internal consistency when applied to a large population.

5. FINAL CONSIDERATIONS

This work presented the methodological path used in the construction and internal validation of the CGQ. Qualitative and quantitative processes were used allowing the construction, selection, modification, and exclusion of questions and categories from the questionnaire. After being submitted to external evaluation and analysis of internal consistency, the instrument obtained content and semantic validation, and proved to be reliable. At the end, the questionnaire consisted of 55 research questions disproportionately distributed among seven research categories.

5.1. Limitations and future research

Factor analysis processes were not used because they are not recommended in studies with a small sample size. Although the CGQ was internal validated, the study demonstrated the difficulty of conducting research in the Brazilian educational context, since, although the sample size was sufficient, it was still small for the potential of the study. While the process of constructing and validating the instrument considered the Brazilian educational context, it is recommended that the instrument be administered to a large number of participants, including participants from other countries and adopting different strategies to motivate participation, so that its results are truly representative and consistent with the reality of the topic.

We expect that the CGQ becomes an important research instrument for the diagnosis of the teaching knowledge of cooperative

games and that it provides evidence of its applicability in different contexts of physical education at school, indicating ways to implement this topic in an educational context. We also hope that the method used for the construction and validation of the CGQ serve as a basis for the construction and internal validation of other research instruments and, thus, contribute to scientific advancement, inside and outside Brazil.

6. Conflict of interest statement

The authors declare no conflict of interest.

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