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Article

Validation of a Cooperative Learning Measurement Questionnaire From a Teaching Perspective

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Abstract

Background: Having measurement tools for assessing the application of cooperative learning from the teaching perspective is essential for the successful implementation of this methodology in schools. The purpose of this study was to develop and validate a tool created from the five essential elements of cooperative learning: positive interdependence, face-to-face interaction, individual responsibility, group processing and social skills. **Method:** The sample consisted of 4,004 teachers (61.1% female and 38.9% male) with an average age of 42.7 years old (DT = 10.04) from all non-university educational stages teaching in 68 schools throughout Spain. **Results:** The results from the confirmatory factor analysis with the final questionnaire, comprising 19 items in five factors, were optimal in all indicators via indices of global or absolute fit (Chi-squared, RMSEA, GFI, NFI, and CFI). The reliability achieved by the definitive test was adequate via both Cronbach's alpha and McDonald's ω (α = 0.958 and ω = 0.960). **Conclusions:** The questionnaire is presented as a valid, reliable instrument for evaluating the application of cooperative learning from the teaching perspective in early childhood education.

Keywords: Cooperative learning, teachers, scale, validation.

Resumen

Validación de un Cuestionario de Medición del Aprendizaje Cooperativo Desde la Perspectiva Docente. **Antecedentes:** disponer de instrumentos de medida que valoren la aplicación del aprendizaje cooperativo desde la perspectiva docente resulta imprescindible para una exitosa implementación de esta metodología en los centros escolares. El objetivo de este estudio fue elaborar y validar un instrumento creado a partir de los cinco elementos esenciales del aprendizaje cooperativo: interdependencia positiva, interacción cara a cara, responsabilidad individual, procesamiento grupal y habilidades sociales. **Método:** la muestra estuvo formada por un total de 4.004 docentes (61,1 % mujeres y 38,9% varones) con una edad media de 42,7 años (DT = 10.04), pertenecientes a todas las etapas educativas no universitarias de 68 colegios distribuidos por todo el territorio español. **Resultados:** los resultados alcanzados en el análisis factorial confirmatorio con el cuestionario final de 19 ítems distribuidos en cinco factores fueron óptimos en todos los indicadores, mediante los índices de ajuste global o absoluto (Chi-cuadrado, RMSEA, GFI, NFI y CFI). La fiabilidad alcanzada por la prueba definitiva es adecuada tanto en el α de Cronbach como la ω de McDonald (α= 0.958 y ω= 0.960). **Conclusiones:** el cuestionario se presenta como un instrumento válido y fiable para evaluar la aplicación del aprendizaje cooperativo desde la perspectiva docente.

Palabras clave: aprendizaje cooperativo, docentes, escala, validación.

One of the notable challenges in education is to discover methodologies that promote students' all-round development. Cooperative Learning (CL) is one such methodology that has gained significant prominence, with numerous studies reporting both social and academic benefits (Carter, 2009; Kyndt et al., 2013; Rego et al., 2018; Tolmie et al., 2010).

Cooperative Learning is an educational approach in which students work in small, heterogeneous groups to help each other learn (Johnson & Johnson, 2009). Unlike traditional group work, in which students are simply put next to each other to work together, CL is only effective when the students interact with each other to achieve shared goals (Johnson & Johnson, 2009; Topping et al., 2017). There is a broad consensus in the literature about the need to use the five essential elements of cooperative learning for this to be effective: (1) positive interdependency, (2) face-to-face interaction, (3) individual responsibility, (4) group processing, and (5) social skills (Saborit et al., 2016; Slavin, 2012).

Positive interdependency means that students depend on each other for success in the task and learning is only possible if all group members contribute. *Face-to-face interaction* means an active learning environment with direct contact where students encourage and support each other. *Individual responsibility* means that no member of the group can be successful without the others also succeeding. Students must be aware that without their contribution, the group will not achieve its objectives. *Group processing* refers to debate, discussion, and group reflection; a cooperative group works well when they reflect properly on their performance. Finally, *the development of social skills* makes for easier group management and will open the way to a common goal. It is about promoting proper skills to generate trust, resolve conflicts, and take group decisions (Johnson & Johnson, 2009,

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2014). By applying these five elements, students are empowered to change their ways of thinking and working on problems with other classmates while cooperation is also encouraged. The way students cooperate and progress means a continual need for reassessing what is learned in practice, which is a fundamental element of the pedagogical process. In short, successfully combining these five elements benefits all of the members of the group (Page, 2017).

Despite the long history of CL, it is only in recent years that is has been the subject of notable interest in the scientific community, possibly because it is considered to be one of the more innovative, motivating approaches in the educational panorama (Cecchini Estrada et al., 2019; Surian & Damini, 2014). In addition, the fact that it can be applied in all educational stages gives it added value (Sharan, 2010). Because of this, there have been continued calls for the implementation of CL in schools along with the suggestion of using measuring instruments to evaluate how it is being applied (Saborit et al., 2016).

Nonetheless, very few instruments have been used to analyze CL in the educational context, which in recent years has become more of an issue. Veenman et al. (2002) were the first to include the five essential elements of CL, however, their scale was designed for an external observer to assess the level of CL rather than the agents involved in the process (students and teachers). Subsequently, the Cooperative Learning Process Scale was developed (Bay & Çetin, 2012), which also included the five elements, although it was validated with a very small sample (177 participants) and the fact that it has a large number of items (48) limits its usefulness.

Newer measuring instruments have appeared, such as the instrument from Atxurra, Villardón, & Calvete (2015), which despite not including all five elements (it did not include individual responsibility), did add evaluation and tutoring in a sample of Spanish and Chilean university students. More recently, Fernández-Río et al. (2017) validated a scale of cooperative learning with a sample of 11,202 primary and secondary school students in 68 schools, the structure of which represented the five basic elements of CL.

All of the instruments described above were constructed from the student perspective, without considering the teachers' point of view. Very few scales have been developed from a teacher perspective, despite numerous studies having documented the importance of the teacher in the implementation of CL (Gillies & Boyle, 2010; Oortwijn et al., 2008; Saborit et al., 2016).

Teachers need to know the principles and methods of CL to implement it in their classroom teaching and stimulate interaction when students work together (Abramczyk & Jurkowski, 2020). If teachers are not involved in the process and participate passively in group tasks, they are not effective (Gillies, 2004). This passivity may be due to a lack of understanding about how to use CL in the classroom (Gillies & Khan, 2008), which calls into question the teachers' prior training in the methodology (Gillies & Boyle, 2011; Nguyen, Terlouw, & Pilot, 2006). In addition, teachers have, on occasion, been shown to plan group work with no preparation to ensure it is applied correctly (Thanh, 2011). Bakkenes, Vermunt, & Wubbels (2010) suggested that teachers' prior training would play a key role in the implementation of CL and their attitudes towards the methodology.

In this regard, Saborit et al. (2016) looked at the effects of CL training on the attitudes of primary and secondary school teachers about implementing it in their classrooms. They found that, after finishing training, teachers exhibited strong positive attitudes towards changing their traditional teaching practices and implementing CL. However, although a good attitude from the teachers would make it easier to establish this methodology in the classroom, it appears that frequent use of cooperative learning does not mean consistent quality in implementation (Abramczyk & Jurkowski, 2020; Völlinger, Supanc, & Brunstein, 2018), making it essential to have proper tools for evaluation and control.

In pursuit of this goal, a scale for management of cooperative learning in the classroom was recently validated (Miguel et al., 2020). This instrument is made up of 12 items and assesses the teachers' planning of cooperative activities in the classroom through three factors: design, monitoring, and evaluation. The scale does have some limitations. The sample was made up of 376 infants-, primary-, and secondary-school teachers who were tutoring student teachers during practical placements. It is not clear whether any of the teachers had received training or had prior knowledge of CL. The study did not report whether teachers used the methodology systematically, occasionally, or whether they simply used some cooperative exercises. Nor does the scale cover the five basic elements of cooperative learning, considered to be essential indicators for accuracy and clarity about the level of application of CL (Saborit et al., 2016).

To our knowledge, there are no questionnaires based on the five fundamental elements that have been validated in samples of teachers who have received training in CL and apply the methodology regularly in their classes. Recent work suggests that combined assessment of teachers and students would improve the quality of the instrument (Miguel et al., 2020). The validation of a questionnaire for teachers with the characteristics noted above would meet the needs identified by the scientific community for control and monitoring of CL in the classroom.

Given that, the main objective of the current study was to create and validate an instrument based on the five essential elements of cooperative learning that would be able to measure the level of application of CL from the perspective of infant-, primary-, and secondary-school teachers with prior training in the methodology.

Method

Participants

The sample comprised 4004 teachers (61.1% women, 38.9% men) with a mean age of 42.7 years (SD = 10.04) from 68 schools all over Spain (except Ceuta and Melilla). The distribution of teachers by educational stage was 8.2% infant school, 38.9% primary school, 48.4% secondary school, and 4.4% *bachillerato* (post-compulsory, pre-university secondary education).

Instruments

Teachers' Cooperative Learning Questionnaire (TCLQ). The first version of the TCLQ was produced by a group of 6 teachers with broad knowledge of cooperative learning and extensive experience in the various educational stages. This was done following the guidelines from Muñiz et al. (2005). Each item was produced following a thorough review of existing instruments (referenced previously), with particular attention paid to those which addressed the five elements of CL. Subsequently, each of the teachers involved created a battery of items which were initially reviewed by the

team members individually before the group attempted to reach a consensus on the items to include. The initial version had 35 items, seven in each of the proposed dimensions: social skills, group processing, positive interdependence, stimulating interaction, and individual responsibility. The responses were on a five-point Likert scale (from 1 = completely disagree, to 5 = completely agree) as it was ideal for subsequent statistical validation. All of the items began with the phrase, "In working groups…". To ensure both content validity and the applicability of the instrument, this initial version was reviewed by a panel of seven experts in teaching and the application of CL in educational contexts in various countries. They used a Likert scale to assess how well each of the items in the initial version of the questionnaire fit the relevant dimension it was measuring.

The Content Validity Coefficient (CVC) was used to assess the level of agreement between the experts, following the approach by Hernández-Nieto (2002). The error assigned to each item (0.00024) was also calculated to reduce possible bias from any of the reviewers. The final CVC was calculated by applying CVC = CVCi – 0.00024. Only items with a CVC equal to or greater than 0.90 were kept. This produced a second version of the questionnaire reduced to 23 items.

Procedure

This study was part of a research project implementing cooperative learning progressively in all of the schools which were part of a National Network of Cooperative Working Schools (NNCWS). To ensure proper implementation of CL, the NNCWS provides a hierarchical control model made up of a national commission responsible for the project, a coordinator in each province, and a coordinator in each school. The project organization includes prior training for teachers continual follow-up throughout the school year. The training is in the form of seminars with a minimum total duration of 25 hours. Given the number of schools, and for operational reasons, training days were held in five different locations, with schools grouped together by proximity. Particular care was taken to give the same training in each location.

After the research team and the national commission responsible for the project received approval from the Ethics Committee at the university, contact was made with as many schools as possible. Teachers were informed of the study objectives and the process. There were two minimum requirements for taking part in the study: (1) teachers needed to have had at least 50 hours (theory and practice) of specific training in cooperative learning; (2) teachers needed to have been systematically applying various CL techniques in their classes for at least a school year. An online version of the questionnaire was created to make it easy for all participants to access it.

Data Analysis

The reliability of the final form of the questionnaire was assessed using Cronbach α and McDonald's ω (ordinal reliability) for the overall scale and for each item.

The validation process followed three phases. First, the items were examined as a whole via Exploratory Factor Analysis (EFA) (SPSS v. 24, 2016), which allowed us to determine the number of possible factors in the questionnaire. Following this initial analysis, we made an initial modification via Pre-confirmatory Factor analysis using the FACTOR program (Unrestricted Factor Analysis) and tested with another pre-confirmatory analysis using JASP free software (JASP v. 0.11.1, 2019). The advantage of analysis with FACTOR and JASP is that they both allow the interpretation of the proportion of variance from each of the factors, in addition to using polychoric correlations, which are the most appropriate for Likert-type questionnaires (Lorenzo-Seva & Ferrando, 2013; Lorenzo-Seva & Ginkel, 2016). Finally, the model was subjected to Confirmatory Factor Analysis using JASP, as it allows the test to be assessed with various estimators of fit.

The indicator of fit was the DWLS estimator, which is the best suited for polychoric correlations. The CFA used indices of overall or absolute fit in all of the test scales (Montaño, 2014).

- Chi squared, which indicates the significance of the model, should give values over .05. However, in large samples, such as ours, this indicator is very sensitive as it is based on the normal χ^2 distribution (Bollen, 1989; Byrne, 1998). For this reason, other goodness-of-fit indices should also be used, one of the most well-known of which is RMSEA (Barbero,Vila, & Holgado, 2011; Byrne, 1998; D'Ancona, 2004).
- Root mean square error of approximation (RMSEA). Scales are considered valid when this index is below .05 (Browne, 1993; Steiger, 1980).
- The Goodness of Fit Index (GFI), which indicates the variability explained by the model. Values above .90 indicate good fit (Jöreskog & Sörbom, 1986).
- Normed Fit Index (NFI), which should give values close to one (Bentler & Bonett, 1980).
- We also added the incremental Comparative Fit Index (CFI), which indicates good fit for the scale with values close to one, and greater than .95 (Bentler & Bonett, 1980).

Results

Internal consistency (reliability)

The tests for reliability of the definitive scale gave Cronbach α= .958 and McDonald's ω= .960. The results by item and the descriptive statistics of the final form of the questionnaire are given in Table 1.

The initial Exploratory Factor Analysis (EFA) gave three factors with 23 items (SPSS v 24, 2016). We used the FACTOR program (v. 10.9.02, 2018) with those three factors to perform a Pre-confirmatory Factor Analysis (PFA), giving excellent results, except for the RMSEA (RMSEA = .047 [.0439 – .0499]) which was very close to .05, the allowed limit (CFI = .996; GFI =.998; NFI = .99).

These results from the first pre-confirmatory analysis indicated that the best fitting model might have only one factor. Consequently, FACTOR was again used to perform an analysis (EFA) with a single factor model. That analysis did not produce acceptable results, with RMSEA = .087, leading us to reject that alternative as it increased the likelihood of type I errors (Ramírez et al., 2015).

The results of the PFA done in parallel using JASP gave better results from the different indices, in line with the theory used in constructing the questionnaire. The PFA indicated five factors.

Table 1
Descriptive statistics, reliability (McDonald ω and Cronbach α), and correlation by item in the overall scale

	Mean	SD	Correlation	McDonald ω	Cronbach α	Asymmetry	Kurtosis
AC1	3.903	0.892	.709	.962	.961	-0.518	-0.157
AC2	4.158	0.772	.626	.962	.962	-0.760	0.584
AC3	4.257	0.763	.697	.962	.961	-0.856	0.543
AC4	4.113	0.817	.722	.962	.961	-0.735	0.318
AC5	3.961	0.871	.744	.961	.961	-0.569	-0.097
AC6	3.634	0.921	.735	.961	.961	-0.327	-0.268
AC7	4.009	0.967	.673	.962	.961	-0.775	-0.022
AC8	3.843	0.886	.763	.961	.960	-0.444	-0.259
AC9	4.001	0.823	.754	.961	.961	-0.611	0.158
AC10	4.141	0.779	.757	.961	.961	-0.726	0.460
AC11	4.073	0.929	.643	.962	.962	-0.836	0.154
AC12	4.008	0.834	.775	.961	.960	-0.647	0.224
AC13	3.688	0.941	.758	.961	.960	-0.431	-0.203
AC14	4.227	0.865	.680	.962	.961	-1.035	0.694
AC15	3.770	0.926	.764	.961	.960	-0.424	-0.305
AC16	4.155	0.862	.660	.962	.961	-0.847	0.239
AC17	4.034	0.881	.716	.962	.961	-0.751	0.262
AC18	2.861	1.040	.666	.962	.962	0.077	-0.439
AC19	3.983	0.872	.715	.962	.961	-0.685	0.208
AC20	3.984	0.868	.742	.961	.961	-0.598	0.007
AC21	4.119	0.866	.718	.962	.961	-0.836	0.381
AC22	4.106	0.879	.710	.962	.961	-0.828	0.281
AC23	3.697	0.945	.710	.962	.961	-0.401	-0.258

However, once the items were distributed into those factors, attempts to perform a CFA were unsuccessful, the model did not work and did not permit analysis. The problem was attempting to perform the analysis using a factor with a single item. This item also appeared in another factor, and the analysis was repeated with the item in that factor. The program indicated communality for items 2, 12, and 16 below .50, thus they were not considered for the CFA. This modification of the PFA continued to fail to give the

Table 2
Teachers' Cooperative Learning Questionnaire (TCLQ)

In working groups…						
1	Students work on dialogue, listening skills, and debate	1	2	3	4	5
2	Students interact with each other during tasks	1	2	3	4	5
3	Students work directly with each other	1	2	3	4	5
4	Students share ideas, knowledge, and points of view with classmates	1	2	3	4	5
5	Students take group decisions between the members of the group	1	2	3	4	5
6	Each member of the group has to make an effort in the group activities	1	2	3	4	5
7	Students listen to classmates' ideas, opinions, and points of view	1	2	3	4	5
8	Students help each other to do the activities	1	2	3	4	5
9	Students interact with each other to do the activities	1	2	3	4	5
10	Each member of the group has to try and participate, even if they do not enjoy the task	1	2	3	4	5
11	Students talk about their work to assess, correct, and improve it	1	2	3	4	5
12	Each member of the group has to participate in the group tasks	1	2	3	4	5
13	Students reflect individually and as a group	1	2	3	4	5
14	The members of the group have skills and abilities which complement each other	1	2	3	4	5
15	The members of the group have different abilities which help them do the task	1	2	3	4	5
16	There is a variety of opinions in the group and this helps us	1	2	3	4	5
17	The members of the group are different, which enriches the work	1	2	3	4	5
18	There are different roles in the group which complement each other	1	2	3	4	5
19	The differences between the members of the group help the group to function	1	2	3	4	5

Note: The factors are as follows: F1 Social Skills = AC 1; AC 13; AC 5; AC 6; AC 8; AC 15. F2 Group processing = AC 17; AC 19; AC 20; AC 21; AC 22; AC 23. F3 Positive Interdependency = AC 11; AC 14. F4 Stimulating interaction = AC 3; AC 4. F5 Individual Responsibility = AC 9; AC 10; AC 7

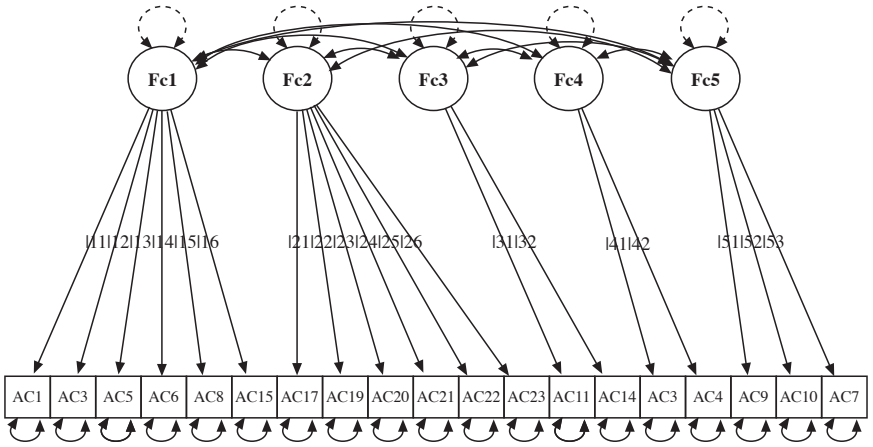

Figure 1. Definitive five-factor model fit via JASP

expected results for the indices of fit. The problem was identified as being with item 18, which appeared in various factors, increasing the values for RMSEA and CFI above those expected. Following an analysis of all of the options, none improved the indicators sufficiently, and the item was removed.

The results of the CFA, using JASP, with the final, 19-item questionnaire (after item 18 had been removed) were excellent (Chi-squared χ^2 (190) = 3443.007, p =.001; RMSEA = <.001 [<.001 – <.001]; GFI=.919; NFI= .942; and CFI= .952) (Figure 1).

Reliability analysis by factor produced the following results: F1 Social Skills, Cronbach α = .916, McDonald's ω = .917; F2 Group Processing, Cronbach α = .912 , McDonald's ω = .913; F3 Positive Interdependence, Cronbach α =.835 , McDonald's ω = .836; F4 Stimulating Interaction, Cronbach α =.840 , McDonald's ω = .841; and F5 Individual Responsibility, Cronbach α = .788 , McDonald's ω = .811. All of the factors gave acceptable results (Campo-Arias & Oviedo, 2008).

The correlations between the factors were also examined (Table 3). A strong relationship was found between them, which suggests the possibility of a second-order factor.

To determine whether there actually was a single factor underpinned by the five latent factors determined by the results of between-factor correlations, a second-order CFA was performed consisting of Cooperative Learning as an overall factor. Analysis via robust maximum likelihood estimators, the most suitable for this type of analysis, gave values (second-order AFC, JASP) for overall fit of: Chi-squared χ^2 (171) = 56537.085 , p =.001; RMSEA = <.001 [<.001 – <.001]; GFI=.922; NFI= .946; and CFI= .948. (Figure 2).

Table 3
Results of the correlation between the final factors, from confirmatory factor analysis

				95% Confidence Intervals	
		Estimated	p	Lower	Upper
Factor 1	Factor 2	.791	< .001	.776	.806
Factor 1	Factor 3	.682	< .001	.661	.704
Factor 1	Factor 4	.844	< .001	.829	.858
Factor 1	Factor 5	.915	< .001	.904	.926
Factor 2	Factor 3	.702	< .001	.682	.723
Factor 2	Factor 4	.712	< .001	.692	.732
Factor 2	Factor 5	.815	< .001	.799	.831
Factor 3	Factor 4	.606	< .001	.580	.632
Factor 3	Factor 5	.760	< .001	.740	.780
Factor 4	Factor 5	.895	< .001	.881	.909

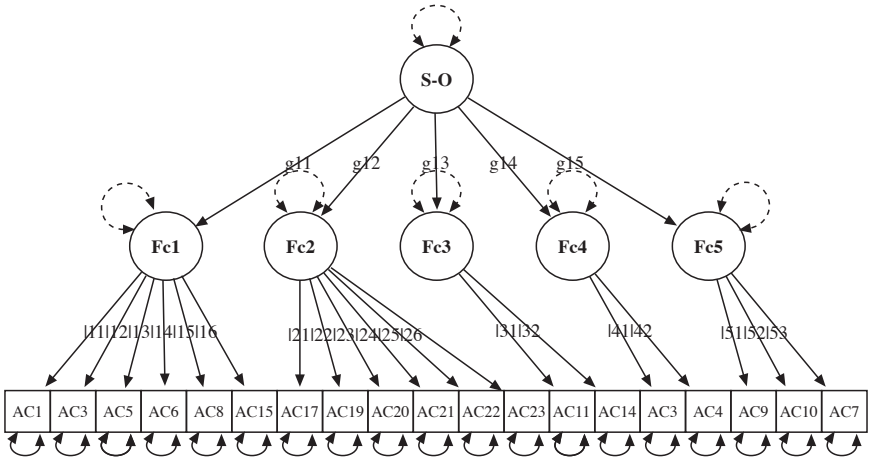

Figure 2. Adjusted second-order factor model of Cooperative Learning

Discussion

The main objective of this study was to create and validate an instrument based on the five essential elements of cooperative learning which would be capable of assessing the level of application of CL from the teachers' perspective. The questionnaire was applied to a large sample of infant-, primary-, and secondary-school teachers with prior training in CL methodology.

The results of the psychometric and confirmatory factor analyses indicate that the instrument has a suitable factorial structure, is reliable, and valid. Reliability indices were acceptable in all cases. Cronbach's α was well above the minimum recommended value of 0.70 for confirmatory studies (Nunnally & Bernstein, 1978). Omega (ordinal alpha, McDonald's ω) is considered an acceptable value of reliability between 0.70 and 0.90 (Campo-Arias & Oviedo, 2008). The results from the confirmatory factor analysis of the final 19-item questionnaire were excellent for all indicators, demonstrating that the TCLQ has good construct validity.

The confirmatory factor analysis followed the standard steps. First, exploratory factor analysis helped us to analyze the data as a whole without any prior hypotheses about its structure, with the results of that analysis giving us the model. This produced an initial structural hypothesis. Using the resulting model, we moved on to using the pre-confirmatory FACTOR program, which unlike SPSS, allows one to choose between linear and non-linear models. Given the Likert-type scores from the questionnaire, FACTOR allowed us to use polychoric correlation matrices, establishing definitive numbers of factors and items. In order to achieve the best fit, we took a minimum value of item-factor loading of > 0.50 (Ferrando & Lorenzo-Seva, 2016).

The definitive model specification used JASP (2019) free software, the benefit of which is the option of using different models of factor estimation, not only the standard ML, used by SPSS, but also ULS and DWLS. The estimation model that best fit our analysis was DWLS as it can analyze all of the postulated theoretical constructions of the questionnaire, although for second-order analysis ML is a more robust, better estimator (Tomás, Oliver, & Hontangas, 2000). The indices of fit used were indices of global or absolute fit; chi-squared, RMSEA, GFI, and NFI, to which we added CFI as it is an incremental or comparative index of fit that allows determination of the definitive model with the independent model or of no relationship between the variables (Montaño, 2014).

Our results are in line with previous studies which have examined other scales of cooperative learning in different educational stages. Atxurra et al. (2015) reported adequate reliability and validity in a scale assessing application of cooperative learning in university education. Similarly, Fernández-Río et al. (2017) produced a valid, reliable instrument in primary, secondary, and baccalaureate which demonstrated excellent psychometric properties with a small number of items. That scale also presented an overall cooperation factor that makes it easier to compare different populations or approaches. However, it is important to note that previous studies have analyzed application of CL only from the student perspective, without considering the role of the teacher. Teachers' participation in the implementation, monitoring, and evaluation of CL and their positive attitudes towards it are essential for success (Saborit et al., 2016).

In this regard, only Miguel et al. (2020), in a recent study, have validated an instrument about managing cooperation in the classroom from a teacher perspective. Unfortunately, that instrument did not include the five basic elements of CL, and it was not reported whether teachers had received any training in CL or were applying it systematically in their classrooms at the time of the study. The Teachers' Cooperative Learning Questionnaire, developed in the current study, has five factors corresponding to the five basic elements and demonstrates high internal consistency. In addition, it has been validated in a large sample of teachers in the four educational stages (infants, primary, secondary, and *bachillerato*).

To determine whether there was a single factor based on the five identified factors we performed a second-order confirmatory factor analysis, with Cooperative Learning as an overall factor. Our results are in line with Fernández-Río et al. (2017), who demonstrated the validity and reliability of a single factor from a student perspective.

The current study allowed us to create a valuable tool to help proper implementation of CL in schools. As well as being the only tool covering the five fundamental factors of CL, it produces an index that undoubtedly improves its potential. However, there are some limitations to be considered. First, the TCLQ was not compared to other variables of interest such as the type of school (public, private, independent), years of CL implementation, or the type of subject. Another limitation is that the stability of the questionnaire over time was not considered, as it was a single evaluation at a single point in the school year. It has been reported that groups or techniques used in CL can become ineffective at any point in the process , (Hsiung, Luo, & Chung, 2014). Future research should address multiple assessments at different points in the school year and consider the other variables noted above.

The study does have some strengths, including the large sample, and the variety of educational stages examined. It is also worth noting the small number of items in the final questionnaire (19). It is evident that an instrument with few items but which has a robust model will have greater applicability. All of that opens the door to new lines of psychoeducational research from a methodology that is growing in popularity.

In conclusion, the TCLQ is, as far as we are aware, the first questionnaire created to analyze the level of application of CL from the teachers' point of view and based on the five basic elements of the methodology. It is a valid, reliable instrument for evaluating application of CL in infant, primary, secondary, and *bachillerato* education. In addition, the organizational structure of the scale, based on the five factors, means it can be compared to other similar instruments oriented at students. It has been suggested recently that the combined assessment of teachers and students would improve application of CL in the classroom and proved better information about it (Miguel et al., 2020). Future studies should address the participation of the two agents involved in the educational process via questionnaires that use the five elements of CL.

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