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# Assessing peer teamwork competence: adapting and validating the comprehensive assessment of team member effectiveness—short in university students

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**Introduction:** The Bologna Plan has promoted competency-based training in European higher education, which requires developing accurate, appropriate assessment tools for its measurement and evaluation.

**Method:** This study adapted and validated the Comprehensive Assessment of Team Member Effectiveness questionnaire on teamwork competence in a university population in the Basque Country, Spain. The questionnaire was first back-translated and adapted by two experts in educational research and then completed by 642 students pursuing baccalaureate degrees in primary education and physical activity and sport sciences at the University of Deusto [215 women, 426 men; ages: 17–25 years ( $M = 21.5$ ;  $SD = 1.3$ )].

**Results and discussion:** A confirmatory factor analysis yielded adequate goodness-of-fit indices, confirming the validity of the instrument's measurement model and indicating that it may be an appropriate tool for assessing teamwork competence among peers for university students in the Basque Country.

## KEYWORDS

teamwork, comprehensive assessment of team member effectiveness, competency-based assessment, validation, scale, peer assessment, university

## Introduction

Competency-based training enables linking the work and civic or social environment with the educational sphere (Ramírez and Morales, 2009). The term *competence* embraces knowing, knowing how to do and knowing how to be (Bunk, 1994; Cajide, 2004; Colás, 2005; Echeverría, 2002; Le Boterf, 2001; Lévy-Leboyer, 2003; Zabala and Arnau, 2007) as well as knowing how to live together (Delors, 1996). These include curricular governance, facilitator training, and assessment strategies, because these components are less commonly or robustly defended (Hean et al., 2018).

Teamwork is one of the more frequently presented transversal competencies as an educational objective in various university studies in diverse areas due to, among other reasons, its high demand in the labour market (García-Garnica et al., 2023; Robles, 2012), which is increasingly globalised, dynamic and complex (De Prada et al., 2022). The labour market's great competitiveness and continual need for innovation demand a wide variety of skills, a high level of specialised knowledge and a broad capacity for adaptation

TABLE 1 Authors' summaries of the dimensions of teamwork competency.

Author	Domains-dimensions
Salas et al. (2005)	Leadership, supervision, support, adaptability, team guidance
Leggat (2007)	Leadership, knowledge and strategic organisation of the team, cooperative attitude and personal motivation (quality of results, commitment and organisation, collaborative work)
Loughry et al. (2007)	Contributing to the team's work, interacting with teammates, keeping the team on track, expecting quality, having relevant knowledge, skills and abilities (KSAs)
Cortez et al. (2009)	Leadership, supervision, feedback, support, coordination, communication, team guidance
Fernández et al. (2008)	Planning or preparation, action (objectives, support and coordination), reflection (explanation and feedback), interpersonal factors, leadership (communication)
Humphrey et al. (2010)	Behavioural dimension (quality of performance, quantity of performance, achievement of objectives), affective dimension (satisfaction, cohesion, identification), cognitive dimension (innovation, potential, learning)
Weaver et al. (2010)	Attitude (confidence, collective effectiveness, task orientation...), communication, leadership, supervision, support, conflict management, mission analysis, team adaptation, cognitive aspects (models or strategies)
Torrelles et al. (2011)	Identity, communication, enforcement and regulation
Hebles et al. (2022) Teamwork Competency Scale	Collective efficacy, learning orientation, planning and coordination, performance monitoring, supportive behavior, establishment of group objectives, problem solving, conflict management, communication

(Kozlowski and Ilgen, 2006), which are difficult to find unless people collaborate in teams (Kozlowski et al., 1999).

Teamwork competence is understood as the ability to relate to and integrate into a work group to contribute to achieving a common goal (Atxurra and Villardón-Gallego, 2015; Barraycoa and Lasaga, 2010; Mora-Vicarioli and Hooper-Simpson, 2016). It includes a sense of belonging and commitment to the team and its activity; interaction and communication among members; planning the actions to be undertaken; and the capacity for continual adaptation to achieve objectives (Torrelles et al., 2011). These dimensions of teamwork competence involve the development of skills such as empathy, responsibility, interpersonal communication and conflict resolution.

In this line, several studies confirm the multidimensional configuration of teamwork competence, including cognitive, affective and behavioural aspects (Cohen and Bailey, 1997; Gil et al., 2008; González-Romá, 2008; Ilgen et al., 2005; Kozlowski and Ilgen, 2006; Rousseau et al., 2008) or a combination of knowledge, techniques, attitudes and behaviours (Perrenoud, 2003; Sarasola, 2000). Furthermore, without being properly dimensions of the concept of teamwork, *Interprofessional Education Collaborative* (2023) states that this competence is composed of 10 principles.

Measurements of a team's effectiveness should take into account the components that structure teamwork (Table 1) and other variables, such as training (Hyatt and Ruddy, 1997), team composition (Carpenter, 2002), the characteristics of team members (LePine, 2003; Mohammed and Angell, 2004) and processes such as communication (Baldwin et al., 1997; Jordan et al., 2002). In addition to skills, some authors contend that team members' relevant knowledge is a key element of team effectiveness (Cannon-Bowers et al., 1995; Stevens and Campion, 1994).

Once teamwork has been defined and its dimensions identified, focusing university education on the development of its competencies requires redefining teaching and learning methods and revising the assessment system towards a performance assessment that not only verifies the acquired theoretical and practical knowledge but also measures how appropriately it is implemented in professional and social contexts (Villardón-Gallego, 2015). This approach to assessment involves collecting information using a variety of sources and techniques (Allen, 2000; Bain, 2006; Barberá, 1999; Dochy et al., 2002; McDonald et al.,

2000) to facilitate student learning (Nicol and MacFarlane, 2006), enabling students to become aware of what they have learnt and how they have learnt it. Active participation in assessment through self-assessment, peer assessment and shared assessment promotes this process of metacognition (Bretones, 2008).

Applying these indications of teamwork competence in the peer assessment of this competence, learners measure or weigh the level or quality of collaboration of members of the same group (Topping, 2009), as peers in a group can be a valid source for assessing this competence (Loughry et al., 2007; Marks et al., 2002). Moreover, such assessment has advantages for both the evaluated and the evaluator, as it activates several cognitive, motivational and emotional processes in both (Topping, 2009; Van Gennip et al., 2009), promoting the development of communication, critical thinking and conflict resolution skills (Lower et al., 2017), among others. Additionally, peer feedback tends to be more accepted than feedback from an authority figure, such as a teacher (Cole, 1991).

For peer assessment to be effective as a formative activity, a trusting relationship between the assessor and the assessed is required (Panadero et al., 2016; Van Gennip et al., 2009). However, anonymity can be ensured in the early stages of the assessment to avoid negative repercussions on social relationships (Rotsaert et al., 2018).

There are various ways of carrying out peer evaluation, including through project diaries (Rafiq and Fullerton, 1996) that provide information on the participation of each group member throughout the process. The peer ranking method (Kane and Lawler, 1978) is based on ranking other people in the group from best to worst. Point allocation, another method used in peer assessment, consists in distributing a total number of points (as determined by the teacher) among the group members (Drexler et al., 2001). The use of rating scales is suggested to allocate points, with each member of the group rating the others on the basis of specific performance or personal characteristics (Kane and Lawler, 1978). One of the seemingly more popular of these scales is the behaviourally anchored rating scales (BARS; Kane and Lawler, 1978). In these scales, each interval is anchored by the description of an incident that exemplifies a corresponding level of the assessed construct (Kane and Lawler, 1978).

Peer assessment instruments for teamwork competence such as Varela and Mead's (2018) scale have recently been validated, but were

not validated in a population of undergraduate students. The Comprehensive Assessment of Team Member Effectiveness (CATME) scale is a specific tool for the assessment of work competence through peer assessment (Loughry et al., 2007). Its original version consists of 87 items, and it has been used in several studies to assess teamwork competence in university students (Camiel et al., 2017; Escribá-Pérez et al., 2018; Farland and Beck, 2019). Loughry et al. (2007) reduced the original version of the CATME to an abbreviated version, comprising five factors that encompass all the dimensions and elements cited by authors who have investigated both the concept of teamwork and its effectiveness. These factors are (a) contributing to the team's work, (b) interacting with teammates, (c) keeping the team on track, (d) expecting quality and (e) having relevant knowledge, skills and abilities (KSAs; Ohland et al., 2012). Their analysis concluded that the five-factor model is superior to all other models, as it fits the data well and is parsimonious. The goodness-of-fit indices of the seven-factor model (a previous version of CATME) and the five-factor model are very similar, and the factors that are combined to create the five-factor model are highly correlated (Loughry et al., 2007). Moreover, the CATME-S dimensions coincide to a large extent with the widely accepted constructs proposed by Salas et al. (2005) better known as the big five of teamwork, which make up the concept of teamwork (Ohland et al., 2012).

The present study used the abbreviated version (CATME-Short), which consists of 33 items (each with five response options) distributed among five factors or dimensions (Loughry et al., 2007). In the adapted version, seven response options are proposed. This version offers the advantage of brevity while preserving the dimensions that make up the construct and yielding adequate psychometric results. Given that there was no known instrument with these characteristics designed and validated for the peer assessment of teamwork competence in the Spanish university context, this study translated and adapted the CATME-Short questionnaire.

## Methodology

### Participants

This research used convenience sampling to recruit 642 students from the University of Deusto in the Basque Country, aged 17–25 years ( $M = 21.5$ ;  $SD = 1.3$ ). Among them, 426 were male and 215 female; 188 were in their first academic year, 183 in their second, 118 in their third, 120 in their fourth and 33 in their fifth.

### Instrument

The original CATME-Short (Ohland et al., 2012) peer assessment instrument is answered by colleagues in a work team. It comprises 33 items distributed in five factors that have the following internal consistencies in its original version (Loughry et al., 2007): contribution to teamwork, Cronbach's alpha ( $\alpha$ ) = 0.90; interaction with colleagues,  $\alpha = 0.91$ ; keeping the team on track,  $\alpha = 0.87$ ; commitment to quality,  $\alpha = 0.81$ ; possession of relevant knowledge, skills and abilities,  $\alpha = 0.78$ . The first factor comprises 8 items, the second 10, the third 7, the fourth 4 and the fifth 4. A Likert-type scale of seven response options was used (1 = *strongly disagree*, 2 = *disagree*, 3 = *rather disagree*, 4 = *neither agree nor disagree*, 5 = *rather agree*, 6 = *agree*, 7 = *strongly agree*).

## Procedure

This research was approved by the ethics committee of the host university, ensuring compliance with the Declaration of Helsinki (World Medical Association, 2013). The students were informed of the objective of the research, the voluntary nature of their participation and the confidential nature of the information collected.

For the translation and adaptation of the CATME, a back-translation process was carried out with the participation of two bilingual experts in educational research. One researcher translated the original items from English into Spanish, and the other person translated them back into English. The versions were compared, and the final formulation of the items was decided by consensus. The translation took into account cultural differences in order to adapt the meaning of the indicators as best as possible.

This translated version was used in a pilot study to check its functioning and comprehension by the university students who were the target of the main study. Seventy-five students in the second year of the bachelor's programme in physical activity and sport sciences took part in the pilot study. The students were asked about the clarity of the items' wording.

This revised version was administered to the final sample of 642 during academic year 2022–2023. For the final study, the link to the scale was provided to each student to enable responding in the classroom. Subsequently, the instructions for completing it were explained, and the students were informed that the results would be confidential and used exclusively for the research. Once the students provided consent, each participant was assigned a code that was given to the person evaluating them so that the latter could indicate who they were evaluating. The estimated time to complete the scale was 10 min.

## Analysis

To test the validity and reliability of the measurements of the translated and adapted instrument, exploratory analyses, confirmatory factor analyses and estimates of the level of internal consistency were carried out. The analyses were conducted using the Jamovi v2.4 application (Jamovi Project, 2023) and the structural equation modelling (SEM) module (Gallucci and Jentschke, 2021).

## Results

### Exploratory analyses

In the exploratory analyses, the mean in every item is around 6 points, and the standard deviation is around 1 point; the most frequent answers are between 5 and 7. All the skewness are negative, reflecting the favourable tendency when it comes to rating the teamwork competence of peers. None of these measures of skewness reaches 2 points. All kurtosis values are positive, as the distributions are sharp, but most of them do not reach 3 points, and none of them reaches 5. The confirmatory factor analysis employed a robust method (maximum likelihood estimation) with the Satorra-Bentler correction (Table 2).

TABLE 2 Exploratory analysis.

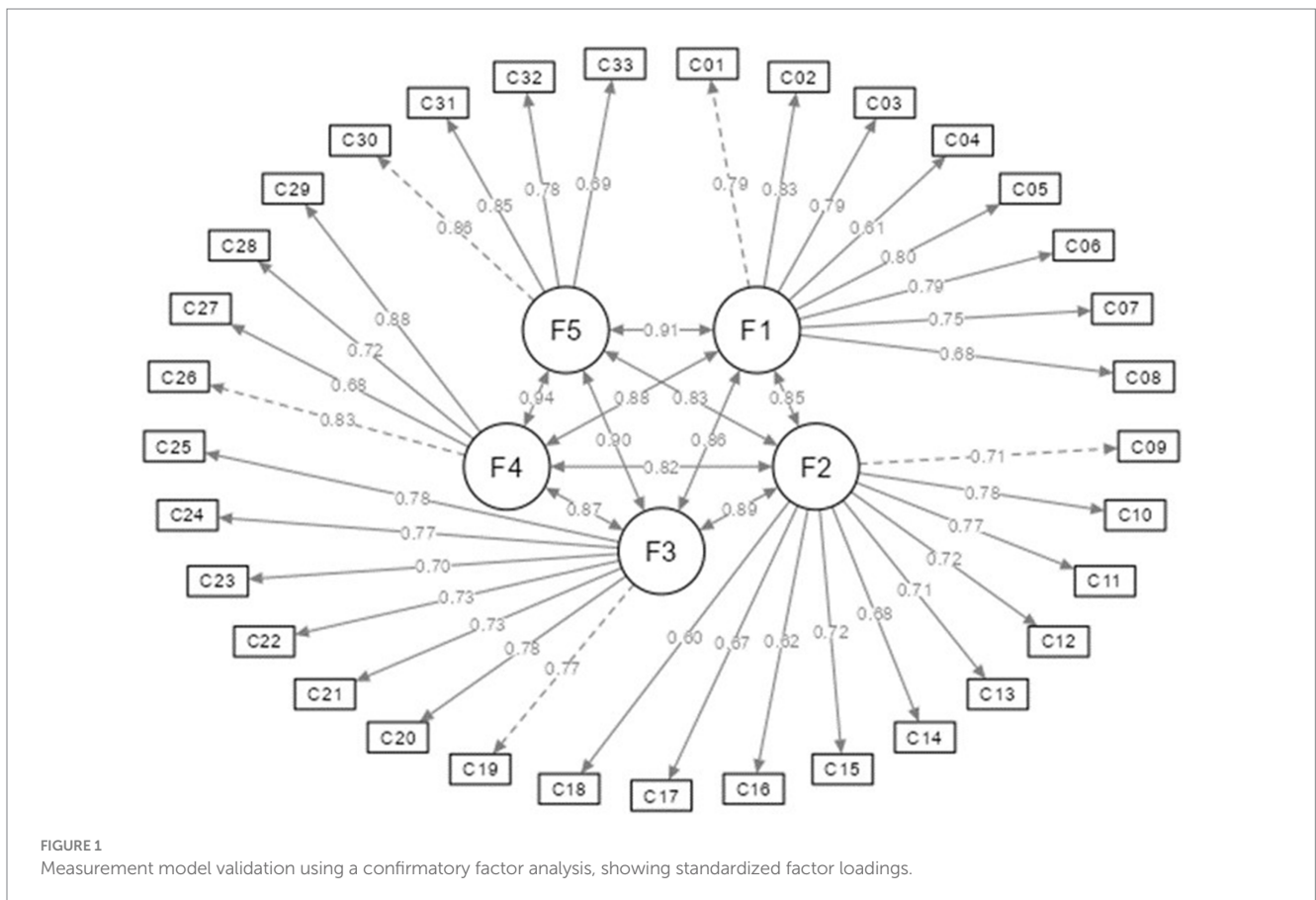
	Question	N	M	SD	Skewness	Kurtosis
C1	Realicé/realizó una proporción justa del trabajo de equipo/ <i>Did a fair share of the team's work</i>	642	5.966	1.017	-1.466	3.158
C2	Cumplió las responsabilidades con el equipo/ <i>Fulfilled responsibilities to the team</i>	642	6.134	0.976	-1.675	4.564
C3	Realizó el trabajo de manera oportuna/adecuada/ <i>Completed work in a timely manner</i>	641	6.089	0.930	-1.509	4.246
C4	Venia a las reuniones de equipo preparado/ <i>Came to team meetings prepared</i>	636	6.088	1.037	-1.545	3.674
C5	Realizó el trabajo de forma completa y precisa/ <i>Did work that was complete and accurate</i>	639	6.002	0.949	-1.481	4.146
C6	Hizo contribuciones importantes al trabajo final del equipo/ <i>Made important contributions to the team's final product</i>	640	5.944	1.053	-1.252	2.354
C7	Perseveró cuando encontramos dificultades/ <i>Kept trying when faced with difficult situations</i>	640	5.798	1.040	-1.064	1.986
C8	Ofreció ayuda a los compañeros cuando fue necesario/ <i>Offered to help teammates when it was appropriate</i>	639	5.919	1.059	-1.155	1.873
C9	Se comunicó efectivamente/ <i>Communicated effectively</i>	642	5.964	1.010	-1.149	1.941
C10	Facilitó comunicaciones efectivas en el equipo/ <i>Facilitated effective communication in the team</i>	639	5.873	0.977	-0.979	1.494
C11	Intercambio información con los compañeros de forma oportuna/adecuada/ <i>Exchanged information with teammates in a timely manner</i>	641	6.028	0.947	-1.131	2.038
C12	Animó a los otros miembros del equipo/ <i>Provided encouragement to other team members</i>	640	5.683	1.189	-1.017	1.353
C13	Mostró entusiasmo por trabajar como un equipo/ <i>Expressed enthusiasm about working as a team</i>	640	5.725	1.102	-0.933	1.054
C14	Escuchó a los compañeros sobre los aspectos que dijeron que afectaban al equipo/ <i>Heard what teammates had to say about issues that affected the team</i>	639	5.942	0.975	-1.236	3.001
C15	Recibió aportes del equipo en asuntos importantes antes de continuar/ <i>Got team input on important matters before going ahead</i>	642	5.826	0.984	-0.877	1.298
C16	Aceptó retroalimentación/feedback sobre sus fortalezas y debilidades de sus compañeros de equipo/ <i>Accepted feedback about strengths and weaknesses from teammates</i>	641	5.945	1.002	-0.955	1.178
C17	Usó el feedback de sus compañeros para mejorar su ejecución/rendimiento/trabajo/ <i>Used teammates' feedback to improve performance</i>	641	5.771	1.062	-0.994	1.632
C18	Permitió que otros miembros del equipo ayudasen cuando fue necesario/ <i>Let other team members help when it was necessary</i>	640	6.116	0.900	-1.212	2.827
C19	Se mantuvo al tanto del progreso de los miembros del equipo/ <i>Stayed aware of fellow team members' progress</i>	640	5.745	1.077	-1.040	1.543
C20	Evaluó si el equipo estaba progresando como se esperaba/ <i>Assessed whether the team was making progress as expected</i>	636	5.552	1.132	-0.783	0.978
C21	Estuvo atento a factores externos que influyeran la ejecución/rendimiento/trabajo del equipo/ <i>Stayed aware of external factors that influenced team performance</i>	641	5.482	1.175	-0.762	0.491
C22	Ofreció feedback constructivo a otros en el equipo/ <i>Provided constructive feedback to others on the team</i>	642	5.611	1.144	-0.998	1.383
C23	Motivó a otros en el equipo para dar lo mejor de sí/ <i>Motivated others on the team to do their best</i>	637	5.549	1.199	-0.870	1.022
C24	Se aseguró que todos en el equipo comprendiesen información importante/ <i>Made sure that everyone on the team understood important information</i>	640	5.708	1.098	-0.782	0.628
C25	Ayudó al equipo a planificar y organizar el trabajo/ <i>Helped the team to plan and organise its work</i>	642	5.855	1.159	-1.216	1.635
C26	Se comprometió para que el equipo tuviese éxito/ <i>Expected the team to succeed</i>	641	6.008	1.036	-1.462	3.309
C27	Creí que el equipo podría producir un trabajo de alta calidad/ <i>Believed that the team could produce high-quality work</i>	640	6.025	1.000	-1.348	2.971

(Continued)

TABLE 2 (Continued)

	Question	N	M	SD	Skewness	Kurtosis
C28	Creyó que el equipo debía alcanzar niveles altos/ <i>Believed that the team should achieve high standards</i>	638	5.978	0.991	-1.014	1.291
C29	Se preocupó que el equipo produjese un trabajo de alta calidad/ <i>Cared that the team produced high-quality work</i>	642	5.921	1.058	-1.175	1.794
C30	Demostró las habilidades y pericia para hacer un trabajo excelente/ <i>Had the skills and expertise to do excellent work</i>	635	5.838	1.048	-1.149	2.024
C31	Demostró las habilidades que eran necesarias para hacer un buen trabajo/ <i>Had the skills and abilities that were necessary to do a good job</i>	638	5.984	0.978	-1.129	1.805
C32	Demostró suficiente conocimiento sobre los trabajos de los compañeros para ayudar si era necesario/ <i>Had enough knowledge of teammates' jobs to be able to fill if necessary</i>	641	5.789	1.084	-1.086	1.821
C33	Conocía como hacer el trabajo de otros miembros del equipo/ <i>Knew how to do the job of other team members</i>	641	5.738	1.108	-0.996	1.270

The size of N is smaller when some people have not specifically answered that question.



### Confirmatory factor analysis

The results of the goodness-of-fit indices are as follows: chi-squared=1737, df=485, normed chi-squared=3.58, the root mean squared error of approximation (RMSEA) test has a value of 0.060 (95% CI: 0.055, 0.064), which can be considered acceptable, as it is below 0.08 (Hu and Bentler, 1998). The standardised root mean square residual (SRMR) has a value of 0.044, also below 0.08. As for the incremental indices, the Tucker-Lewis index (TLI) indicates a

value of 0.915, the Bentler-Bonett normalised fit index (NFI) a value of 0.915 and the comparative fit index (CFI) a value of 0.915. In all three cases, the values are above 0.90 (Figure 1: Table 3).

### Confirmatory factor analysis

All the indicators show statistically significant relationships with the latent factors (Table 3), with standardised estimates higher than



TABLE 3 Confirmatory factor analysis.

Latent variable	Indicator	Question	$\beta$	SE	z	p
F1: Contribución al trabajo de equipo (Contributing to the team's work)	C1	Realicé/realizó una proporción justa del trabajo de equipo/Did a fair share of the team's work	0.789	0.000		
	C2	Cumplió las responsabilidades con el equipo/Fulfilled responsibilities to the team	0.826	0.042	23.355	<0.001
	C3	Realizó el trabajo de manera oportuna/adecuada/Completed work in a timely manner	0.791	0.047	19.316	<0.001
	C4	Venía a las reuniones de equipo preparado/Came to team meeting prepared	0.610	0.072	10.778	<0.001
	C5	Realizó el trabajo de forma completa y precisa/Did work that was complete and accurate	0.802	0.050	18.732	<0.001
	C6	Hizo contribuciones importantes al trabajo final del equipo/Made important contributions to the team's final product	0.789	0.055	18.798	<0.001
	C7	Perseveró cuando encontramos dificultades/Kept trying when faced with difficult situations	0.747	0.060	16.071	<0.001
	C8	Ofreció ayuda a los compañeros cuando fue necesario/Offered to help teammates when it was appropriate	0.676	0.064	13.722	<0.001
F2: Interacciones con los compañeros (Interacting with teammates)	C9	Se comunicó efectivamente/Communicated effectively	0.710	0.000		
	C10	Facilitó comunicaciones efectivas en el equipo/Facilitated effective communication in the team	0.776	0.052	20.187	<0.001
	C11	Intercambio información con los compañeros de forma oportuna/adecuada/Exchanged information with teammates in a timely manner	0.768	0.053	19.091	<0.001
	C12	Animó a los otros miembros del equipo/Provided encouragement to other team members	0.719	0.082	14.425	<0.001
	C13	Mostró entusiasmo por trabajar como un equipo/Expressed enthusiasm about working as a team	0.715	0.077	14.155	<0.001
	C14	Escuchó a los compañeros sobre los aspectos que dijeron que afectaban al equipo/Heard what teammates had to say about issues that affected the team	0.677	0.064	14.010	<0.001
	C15	Recibió aportes del equipo en asuntos importantes antes de continuar/Got team input on important matters before going ahead	0.718	0.058	16.803	<0.001
	C16	Aceptó retroalimentación/feedback sobre sus fortalezas y debilidades de sus compañeros de equipo/Accepted feedback about strengths and weaknesses from teammates	0.618	0.064	13.422	<0.001
	C17	Usó el feedback de sus compañeros para mejorar su ejecución/rendimiento/trabajo/Used teammates' feedback to improve performance	0.675	0.073	13.731	<0.001
	C18	Permitió que otros miembros del equipo ayudasen cuando fue necesario/Let other team members help when it was necessary	0.600	0.058	12.624	<0.001

(Continued)

TABLE 3 (Continued)

Latent variable	Indicator	Question	$\beta$	SE	z	p
F3: Manteniendo al equipo en trayectoria (Keeping the team on track)	C19	Se mantuvo al tanto del progreso de los miembros del equipo/ <i>Stayed aware of fellow team members' progress</i>	0.768	0.000		
	C20	Evaluó si el equipo estaba progresando como se esperaba/ <i>Assessed whether the team was making progress as expected</i>	0.783	0.052	20.660	<0.001
	C21	Estuvo atento a factores externos que influyeran la ejecución/rendimiento/trabajo del equipo/ <i>Stayed aware of external factors that influenced team performance</i>	0.728	0.060	17.384	<0.001
	C22	Ofreció feedback constructivo a otros en el equipo/ <i>Provided constructive feedback to others on the team</i>	0.728	0.057	17.841	<0.001
	C23	Motivó a otros en el equipo para dar lo mejor de sí/ <i>Motivated others on the team to do their best</i>	0.703	0.071	14.497	<0.001
	C24	Se aseguró que todos en el equipo comprendiesen información importante/ <i>Made sure that everyone on the team understood important information</i>	0.769	0.062	16.453	<0.001
	C25	Ayudó al equipo a planificar y organizar el trabajo/ <i>Helped the team to plan and organise its work</i>	0.776	0.055	19.691	<0.001
F4: Compromiso con la calidad (Expecting quality)	C26	Se comprometió para que el equipo tuviese éxito/ <i>Expected the team to succeed</i>	0.826	0.000		
	C27	Creyó que el equipo podría producir un trabajo de alta calidad/ <i>Believed that the team could produce high-quality work</i>	0.678	0.053	14.930	<0.001
	C28	Creyó que el equipo debía alcanzar niveles altos/ <i>Believed that the team should achieve high standards</i>	0.719	0.053	15.748	<0.001
	C29	Se preocupó que el equipo produjese un trabajo de alta calidad/ <i>Cared that the team produced high-quality work</i>	0.879	0.043	25.134	<0.001
F5: Demostración de conocimiento relevante, habilidades y habilidades (Having relevant knowledge, skills and abilities [KSAs])	C30	Demostó las habilidades y pericia para hacer un trabajo excelente/ <i>Had the skills and expertise to do excellent work</i>	0.861	0.000		
	C31	Demostó las habilidades que eran necesarias para hacer un buen trabajo/ <i>Had the skills and abilities that were necessary to do a good job</i>	0.850	0.042	22.121	<0.001
	C32	Demostó suficiente conocimiento sobre los trabajos de los compañeros para ayudar si era necesario/ <i>Had enough knowledge of teammates' jobs to be able to fill if necessary</i>	0.785	0.051	18.282	<0.001
	C33	Conocía como hacer el trabajo de otros miembros del equipo/ <i>Knew how to do the job of other team members</i>	0.689	0.057	14.847	<0.001

Confirmatory factor analysis.

0.6 in all cases (Figure 1). These results confirm the validity of the five-factor measurement model. The correlations between the factors are higher than 0.82, and the relationship between factor 4 (Expecting

quality) and factor 5 (Having relevant knowledge, skills and abilities [KSAs]) is noteworthy at 0.94. Table 4 shows that the various internal consistency indices, Cronbach's  $\alpha$  and omega ( $\omega$ ) are also adequate.

TABLE 4 Reliability Indices.

Variable	$\alpha$	$\omega_1$	$\omega_2$	$\omega_3$	H
F1: Contribución al trabajo de equipo ( <i>Contributing to the team's work</i> )	0.911	0.913	0.913	0.916	0.816
F2: Interacciones con los compañeros ( <i>Interacting with teammates</i> )	0.904	0.905	0.905	0.902	0.844
F3: Manteniendo al equipo en trayectoria ( <i>Keeping the team on track</i> )	0.901	0.900	0.900	0.896	0.798
F4: Compromiso con la calidad ( <i>Expecting quality</i> )	0.865	0.862	0.862	0.849	0.712
F5: Demostración de conocimiento relevante, habilidades y habilidades ( <i>Having relevant knowledge, skills and abilities [KSAs]</i> )	0.873	0.872	0.872	0.868	0.712

## Discussion

This study adapted and validated the CATME-Short scale (Loughry et al., 2007) to measure teamwork competence in Spanish in a university population. By comparison, one of the most recent examples of validating an instrument to assess teamwork competence is the instrument developed by Varela and Mead (2018). In the results of our confirmatory factor analysis, the RMSEA yielded a somewhat better goodness-of-fit index than was found for Varela and Mead's (2018) instrument, which gave a value of 0.065 in validating the teamwork measure as compared to the CATME-Short's value of 0.060 in our study. However, the results of the CFI value in our study are in line with those obtained by Varela and Mead (2018) (0.914 and 0.915, respectively). Like the CATME-Short in this study, the latter instrument used a 7-point Likert scale (Varela and Mead, 2018).

The relationship between the various dimensions or factors in our study is high (above 0.82), which may be related to the similarity of their predictor variables (such as personality traits, agreeableness or conscientiousness), which influence the behaviour of team members (Barrick and Mount, 1991). Factor F1 (Contributing to the team's work) and factor F4 (Expecting quality) and factor F1 and F5 (Having relevant knowledge, skills and abilities) have correlations of 0.88 and 0.91, respectively. According to Stevens and Campion (1999), knowledge, skills and general teamwork skills correlate almost perfectly with cognitive ability. Loughry et al. (2007) say that high student ability may enable students to be more responsible in personal interactions and make good decisions to keep the team on track, which may explain the relationships between factor F1 and F2 (Interacting with teammates) and F1 and F3 (Keeping the team on track), which are both above 0.85. In the case of the factor scores, although there are common antecedents, the high scores may result from the peer evaluation's being influenced by the halo effect (Harris and Barnes-Farrell, 1997), which is defined as an individual's bias when evaluating a specific aspect based on that individual's overall evaluation, which leads him/her to evaluate all the elements associated with it consistently with the overall impression (Thorndike, 1920).

The exploratory analyses indicate that the mean score of the 33 items on the scale is close to 6.0, a favourable outcome that seems to be common in peer evaluations, which tend to be at least as high, and often higher, than teacher evaluations (Topping, 1998). The explanation for the concentration of scores between 5 and 7 points can be found in a meta-analysis that revealed that the correlations between dimensions of job performance, when the assessment has been conducted among peers, are weighted by 63% due to the halo bias (Viswesvaran et al., 2005).

The values of the goodness-of-fit and internal consistency indices show that the CATME-Short instrument has adequate psychometric

properties. To our knowledge, no previous study has translated and validated the CATME-Short for the peer assessment of teamwork competence in Spanish.

## Conclusion

This study provides a valid tool for assessing teamwork competence among peers as evidenced by the results: an RMSEA of 0.060, an SRMR of 0.044 (both less than 0.08) and TLI, NFI and CFI incremental indices close to 1.0 (all with a value of 0.915). In addition, the factor loadings confirm the internal consistency of the constructs, all of them being above 0.82.

Among the limitations of this study is the geographical homogeneity of the sample, as it employed a convenience sample. In addition, we did not consider the phase of the project or the assigned work of each evaluator and evaluated participant, which are relevant, as the importance of the dimensions and contributions of each team member are relative based on the phase of the team's development (Loughry et al., 2007). Another limitation may be the halo effect on peer ratings. For this reason, a potential line of research is determining the halo effect on senior students and whether it varies by gender, grade, quality of relationships, etc. If this effect is identified, a corrective index could be devised so that these scales more accurately reflect reality. It would also be interesting to conduct a longitudinal study to measure whether teamwork competence improves over the course of higher education and thus confirm that this competence indeed develops during this academic period. To conclude the discussion of future lines of research, it is suggested to find the relationship of the development of teamwork competence to academic performance as well as to the use of peer assessment to measure it; authors such as Van Zundert et al. (2010) relate improvement in students' academic performance to this type of well-designed assessment. As another future line of research, it is necessary to investigate the possible roles that team members may have played, such as leadership. To this end, consideration could be given to incorporating possible individual interviews and thus enrich the research. In addition, it may be interesting to analyse the burden of the cultural context, as this may have been a determining factor in understanding both the functioning of the team and the co-evaluation scale itself.

Ultimately, this study contributes to the field of competency-based assessment in higher education by providing a validated tool to measure peer teamwork competence, which is essential for the academic and professional development of students in the European context.



## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving humans were approved by Comité de Ética en la investigación de la Universidad de Deusto ETK-52/23-24. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

AG: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. JS: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. IU: Conceptualization, Formal analysis, Investigation, Resources,

Supervision, Writing – review & editing. IO: Conceptualization, Investigation, Resources, Writing – original draft, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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