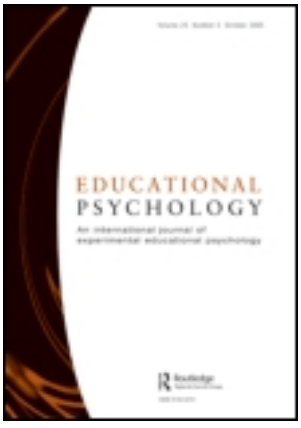

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J. Reinaldo Martínez-Fernández [a], Mariona Corcelles [b] & Maria Cerrato-Lara [b]

[a] Educational Psychology, Universitat Autònoma de Barcelona, Barcelona, Spain

[b] Universitat Ramon Llull, Barcelona, Spain

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The Conceptions about Teamwork Questionnaire: design, reliability and validity with secondary students

J. Reinaldo Martínez-Fernández[a]*, Mariona Corcelles[b] and Maria Cerrato-Lara[b]

[a]*Educational Psychology, Universitat Autònoma de Barcelona, Barcelona, Spain;*
[b]*Universitat Ramon Llull, Barcelona, Spain*

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In this study, we present the conceptions about teamwork questionnaire designed to evaluate the conceptions that secondary students have about teamwork. Participants were 309 students aged 15–16 from eight secondary schools, seven from Barcelona and one from Girona (Spain). The original 27-item questionnaire was reduced according to expert assessment and exploratory factor analysis to 20 items related to three conceptions about teamwork: individualistic, complementary and cooperative. By scores of factor analysis, the results show that empirically there are these three conceptions about teamwork with an appropriate level of reliability and of construct validity according to the theoretical hypotheses. There is no gender difference, but there are differences regarding types of school. The results are discussed with an emphasis on the relevance of this questionnaire as an instrument to identify and train secondary students in the conceptions about teamwork.

Keywords: teamwork; conceptions; secondary school; cooperative learning

Introduction

Why is cooperation important?

Over the past few decades, teamwork has become increasingly important. It is considered a methodological strategy to reinforce active and participative learning (Brown & Campione, 1990; Rogoff, Matusov, & White, 1996; Topping & Ehly, 1998). In fact, it is so important that according to the Organisation for Economic Co-operation and Development (OECD) (2002) learning to cooperate is regarded as one of the essential competences that any person in the twenty-first century should possess.

In the educational context an increasing number of studies have recognised the advantages of cooperation (Johnson, Johnson, & Stanne, 2000; Slavin, 1996). These advantages relate to the learning and socialising processes. In relation to the learning process, previous researchers (Johnson et al., 2000; Slavin, 1996) have argued that cooperation contributes to creating a positive classroom learning environment that fosters active participation, so that all students play a central role in the learning process and master the academic material more efficiently. Research by Johnson et al. (2000), as well as the contributions of Slavin (1996) among others, also highlight the social aspect of cooperative work, since cooperation promotes more

*Corresponding author. Email: josereinaldo.martinez@uab.es

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intense and higher quality relationships that help the development of interpersonal skills, facilitating the integration of all students, as well.

In any case, cooperative work can give students the opportunity to learn from their equals and not only from their teachers thanks to diversity in the classroom (the teacher would not be the only provider of knowledge). Thus, the class would turn into an authentic learning community (Brown & Campione, 1990). As a result of this, cooperative work may be regarded as a key factor in educational innovation.

Despite these positive effects of teamwork, the fact that most of these studies do not take place in 'authentic' classroom settings and that they provide little practical advice for teachers who have to manage long-term multiple groups should be taken into account (Blatchford, Baines, Rubie-Davies, Bassett, & Chowne, 2006). In this regard, one of the major challenges for today's research on teamwork is to provide a systematic, multi-dimensional description of cooperative practices in authentic learning contexts.

Therefore, finding learning strategies to facilitate this competence is a priority in compulsory education, especially if we consider that learning through cooperative tasks ought to play a key role in secondary education (UNESCO/OREALC, 2002) as expressed in the curricula reviewed from various countries.

The effectiveness of peer learning has been studied from different theoretical perspectives. On the one hand, from a cognitive point of view (Mugny & Doise, 1983), empirical research on conceptual change (Mason, 2001) has shown that confrontation of divergent points of view can restructure conceptual and cognitive structures through sociocognitive conflict strategy, which promotes learning. On the other hand, from a sociocultural approach (Vigotsky, 1978; Wertsch, 1991), the effectiveness of peer learning is explained by the fact that students take on the role of mediators of learning from other classmates. The more expert students can help and provide opportunities for guided practice to those less expert (Rogoff, 1990). This process of giving and receiving assistance and explanations enables students to identify gaps or misunderstandings, clarify their own ideas and, consequently, achieve positive benefits (Cortese, 2005; Duran & Monereo, 2005; Palincsar & Brown, 1984; Webb, 1989).

However, the fact that teamwork does not always produce positive cooperative learning experiences has to be considered. Teamwork could not occur spontaneously. Besides, structure in teamwork interaction could be needed to enhance the conditions of the maximum cooperation possible among equals (Johnson & Johnson, 1984; Slavin, 1996; Sharan, 2010; Topping, 2005).

Empirical research has shown that teamwork processes among peers are complex and that they depend on contextual and personal variables. Therefore, several studies have focused on diverse variables considered to influence the effectiveness of teamwork such as the role of the teacher in activities (Meloth & Deering, 1999; Mercer, 1996), team gender composition (Monereo, Castelló, Martínez-Fernández, & Gutiérrez-Braojos, 2011), the levels of the team members' skills and skill training (Prichard, Stratford, & Bizo, 2006; Stevens & Campion, 1999), the task structure (Arvaja, Häkkinen, Eteläpelto, & Rasku-Puttonen, 2000; Gillies, 2003), resource interdependence (Buchs, Butera, & Mugny, 2004; Ortiz, Johnson, & Johnson, 1996), the quality of peer interaction and team dynamic (Arvaja, Häkkinen, Rasku-Puttonen, & Eteläpelto, 2002) or the type of student involvement in teamwork (Hijzen, Boekaerts, & Vedder, 2007; Järvelä, Näykki, Laru, & Luokkanen, 2007).

Despite all these variables, few studies have focused on students' conceptions of teamwork, which would be an interesting object of study. Although cooperation is one of the attributes that defines the concept of team (Johnson & Johnson, 1984), in practice this conceptualisation is not always well understood. Consequently, some students have negative attitudes towards teamwork and refuse to work in teams because they perceive teamwork as inequity at work that gives rise to tension, conflict and demotivation (Guerin, 2003). In contrast, other students have a more positive perception of teamwork (Rose & McCaslin, 2008).

Taking into account the fact that, although there is considerable literature on the use of questionnaires, interviews and/or task proposals to assess cooperative skills or interactions, there are no easy application materials to assess conceptions of teamwork, more research is needed in this field.

Why and how should teachers evaluate what students think about cooperation?

Considering the special importance of cooperative learning environments to secondary education in the last few years, it would be useful to establish clearly defined criteria which would enable teachers to understand the conceptions their students have about cooperation. If teachers have access to this information, they may understand better how their students act in collaborative tasks and may then offer more adjusted help in their attempt to make students learn to work with others. In other words, to consider what the experience of working in groups means to students may be useful for educating them in cooperative abilities (Johnson, Johnson, & Holubec, 1999; Prichard et al., 2006; Simsek & Tsai, 1992).

In this respect, it would be interesting to develop a questionnaire to find out students' conceptions about teamwork, which would also be positive for two other reasons. Firstly, the identification of students' conceptions of teamwork could provide relevant information that enables teachers to make decisions about how to put students into groups and organise the classroom as a learning community (Brown & Campione, 1990; Rogoff et al., 1996); it would also be useful for researchers in order to make decisions about how to group students in their research. Secondly, it would also allow teamwork to be considered (the school system only tends to consider what is conceived as 'possible to assess') and in this respect the importance of cooperation to the educational context to be emphasised (Boud, Cohen, & Sampson, 2001).

As we mentioned in the first section, there are relevant results in research on teamwork oriented to its optimization. However, very few studies have concentrated specifically on conceptions of how cooperative work is understood. From our point of view, similar or dissimilar ways of understanding cooperation within the same group are also a key element to team success or failure.

If students are requested to coordinate their behaviours within peer groups, they inevitably need to know their implicit conceptions about teamwork and the instrument designed may be useful for introducing students to the intervention field. However, it should be emphasised that the evaluation of cooperation is a complex task because although indirect methods (such as the application of scales, standardised questionnaires and interviews) have well-known methodological limitations, direct procedures (such as observation, audio and video recording analysis, or think-aloud protocols) are excessively laborious and expensive for evaluation on a large scale (O'Neil, Chung, & Brown, 1997).

Our concern here is with indirect methods, and more specifically, with research that collects data through questionnaires and scales. Some of the studies carried out in order to get to know what students think about cooperation are centred on analysing their perceptions of cooperation after a teamwork experience, that is to say from the point of view of assessment (Burdett, 2003; Henry, 2000; Jules, 1992; Leinonen, Järvelä, & Häkkinen, 2005; Phipps, Phipps, Kask, & Higgins, 2001). In contrast, several studies are focused on general beliefs about cooperation (Nagahama, Yasunga, Sekita, & Kouhara, 2009) and teamwork (Van den Bossche, Gijselaers, Segers, & Kirschner, 2006; Wang, MacCann, Zhuang, Liu, & Roberts, 2009) and students' attitudes towards cooperation in general (Bonaiuto, 1997; Waugh, Bowering, & Chayarathee, 2005) and in specific before (Simsek & Tsai, 1992), after (Leikin & Zaslavsky, 1997; Whicker, Bol, & Nunnery, 1997) and both before and after a cooperative experience (Szostek, 1994; Walker, 2001).

Other studies are centred on analysing students' preferences for cooperative learning vs. other learning modalities, especially competitive learning (Feldhusen, Dai, & Clinkenbeard, 2000; Kline, 1995; Neber, 1994; Simmons, Wehner, Tucker, & King, 1988), and both vs. competitive and individualistic learning (Jules, 1992; Owens & Straton, 1980).

The studies centred on students' preferences make conceptual contributions beyond a positive or negative evaluation of a specific cooperative learning experience. Specifically, Jules (1992) and Owens and Straton (1980) emphasise and characterise the conceptual distinction made by Johnson, Johnson, and Scott (1978) in relation to three possible learning structures in the classroom: cooperative, competitive and individualistic structures. Other authors such as Mulryan (1994) also establish these structures in their analysis of conceptions collected through interviews.

A proposal to evaluate what students think about cooperation

Focusing on indirect methods to evaluate conceptions of teamwork, in this study we design a questionnaire based on the three learning structures that complements the previous ones. Instead of offering the competitive conception, such a questionnaire offers an intermediate conception halfway between the individualistic and the cooperative conceptions. From a different perspective and taking into account this three learning structures, our proposal is similar to the study undertaken by Nagahama et al. (2009) in which two of the three factors identified are the usefulness of cooperation and individual orientation. In contrast, unlike the instruments reviewed that focus on students' perceptions in relation to cooperative experiences, our questionnaire assesses general conceptions of teamwork. One last thing, among the instruments reviewed, only two specifically measure teamwork as their object of study (Van den Bossche et al., 2006; Wang et al., 2009), which is an interesting starting point. Indeed, it is important to evaluate conceptions of cooperation and to analyse to what extent students conceive of cooperation as an essential characteristic of teamwork. However, none of these two instruments assess teamwork from different learning structures as our instrument does and we think this combination makes our instrument an interesting contribution.

In the design of the conceptions about teamwork questionnaire (CTQ) three theoretical factors have been considered in relation to teamwork: (1) the individualistic conception in which working with others is understood by students as independent work for each group member; (2) the complementary conception in which working

with others is understood as pair of individual work that is put together with the 'copy and paste' mechanism; and (3) the cooperative conception in which working with others is understood in terms of interaction, which points to the restructuring of a task and to a final product as a result of truly integrated teamwork.

Because these three theoretical factors have traditionally been studied from the point of view of interactions and in our study we want to refer to them from the perspective of conceptions of teamwork, we think it is important to focus on what the cooperative, complementary and individualistic conceptions are.

Cooperative conception

The cooperative conception is the result of high-quality interaction within the team as members are interested in learning and working together towards the acquisition of knowledge that promotes the co-construction of shared knowledge, and therefore, a deeper understanding and new knowledge creation are achieved.

The cooperative conception is based on the integration of different authors' contributions. Firstly, the conception concerns Mercer's definition of exploratory talk (1996) as one in which speakers deal with others' ideas in a critical but constructive way. Secondly, the cooperative conception takes into account the definition of critical construction of shared knowledge given by Arvaja et al. (2002). This definition is based on the one proposed by Mercer, but attaches importance to joint decision-making, mutual involvement in the common goal of increasing knowledge and understanding as well as the commitment to solving problems together. Thirdly, it refers to Bakhtin's definition of internally persuasive discourse. According to Farmer (1995, p. 307), it is a 'discourse that ranges freely among other discourses, that may be creatively recontextualized and that is capable of engaging other discourses in dialogue'. This definition brings the notion of creativity and personal appropriation of other discourses through the tension between multiple perspectives and opinions (multivoicedness). It is a dialogical discourse opposed to a monological speech.

Moreover, we have collected Johnson et al.'s (1999) contributions regarding positive interdependence viewed as key to effective cooperation (individual success depends on team success and *vice versa*). In this respect, Erkens, Jaspers, Prangsma, and Kanselaar (2005) also consider the mutual dependence on resources, information or tools as essential to encourage reciprocal communication among participants, which is crucial for discussion, negotiation and joint-construction of meanings.

Complementary conception

The complementary conception is characterised by the complementation and accumulation of information rather than the co-construction of knowledge.

The complementary conception is also based on the integration of different authors' contributions. Firstly, the conception refers to the definition of cumulative discourse by Mercer (1996) as one in which speakers complement others' contributions in an uncritical way, adding their own information, which is, in some sense, a useful way of interacting by sharing information. *Secondly, this kind of conversation is similar to Arvaja et al.'s* (2002) *pattern of interaction referred to as uncritically knowledge sharing with little controversy.* These authors emphasise the idea of uncritical construction resulting from interaction based on the presentation and distribution

of information. In this regard, they suggest that the goal of participants is not to deeply understand the subject matter but to quickly end the task. Finally, we have collected the study conducted by Johnson et al. (1999) which describes working group as characterised by the division of tasks and lack of positive interdependence.

Individualistic conception

The individualistic conception is characterised by lack of joint knowledge construction as there is little interaction or low-quality interactions among participants.

The characteristics of the individualistic conception have also been extracted from previous authors' contributions. On the one hand, the individualistic conception is related to the definition of disputative discourse by Mercer (1996) associated with disagreement and with individual decision-making. On the other hand, this conception can be associated with the dominant-leader pattern of interaction defined by Arvaja et al. (2002). These authors imply the existence of a dominant person who imposes his/her view without considering others' opinions and without giving explanations. Therefore, conversations are mostly one-sided uncritical knowledge sharing. The leader makes all the decisions and the others approve of his/her actions. In this pattern of interaction the ideas are not reasoned and discussion is based almost solely on one point of view. There is no equal cognitive participation of all the members. Furthermore, Bakhtin (1981) states that the authoritarian discourse is used by the individual who uses his/her authority to impose his/her voice, fidelity and acquiescence. It is characterised by a closed structure as it precludes dialogue (monological discourse). Therefore, it does not allow transforming and generating new meanings.

Aim of the study

In this work, our main aim was to design a questionnaire with the purpose of having a reliable instrument with an easy application to the secondary classroom for identifying students' conceptions of teamwork. Considering the different nature of the team interactions defined above the basis of our study, we wanted to find out prevalent conceptions of teamwork basing our analysis on a representative sample of teenagers in different types of schools and check if the factors defined (individualistic, complementary and cooperative conceptions) could be validated theoretically and empirically.

Method

Participants

The CTQ was completed by a sample of 309 15–16-year-old students from eight secondary schools, seven from Barcelona and one from Girona (Catalonia, Spain), of which 172 (56%) were female and 137 (44%) were male. Participation was voluntary. The schools selected were known in advance by the research team from previous studies or teachers training. *Five schools were located within the city of Barcelona, two in the surrounding area of Barcelona and another one was located in a village in Girona. This distribution represents Catalan high school student population*. All the selected schools were of medium socio-economic status (working class).

Instrument

In this study we used the CTQ previously designed within the Spanish government project, the EVACOOP project (Martínez-Fernández, Duran, Corcelles, Fuentes, & Cerrato, 2009). The design of this questionnaire was based on three factors according to individualistic, complementary and cooperative conceptions with 20 items on a five-point Likert scale from 1 = *never* to 5 = *always*. As described in the introduction, the three conceptions – from an individualistic conception (e.g. 'Teamwork brings me nothing, I waste time and effort') to an integrated and cooperative conception (e.g. 'I prefer to work in a group, rather than alone') – correspond to different views of teamwork. As an intermediate attitude towards teamwork, a complementary conception was theoretically defined (e.g. 'The success in a team tends to rely on one or few students who bring solutions separately').

Procedure

Initially, a large list of activities associated with each of the three theoretically identified conceptions was elaborated and discussed by the research team during the EVACOOP project meetings. Thus, nine items for each of the theoretical conceptions were elaborated and this added up to 27 items in total. The questionnaire was designed in Catalan and applied to a pilot sample of six secondary school students to ensure their comprehension level. Next, it was applied to a new pilot sample ($N = 111$) of Catalan students from two secondary schools in Barcelona. Finally, after the use of exploratory factor analyses with different extraction and rotation methods, and expert judgement a final questionnaire was designed with 20 items – which were considered the best empirical structure according to the Kaiser-Meyer-Olkin (KMO) values, Bartlett's test, explained variance and theoretical assumptions – grouped into three different factors.

Next, the revised version of the questionnaire was applied by teachers themselves from the eight participant centres ($N = 309$) during class sessions. The duration of application was approximately 15 min and the students showed no comprehension problems.

Later, using SPSS 17.0 for Windows, results were analysed using factor analysis and reliability index with Cronbach's alpha for each of the sub-scales. Additionally, a correlation, cluster and chi-square analysis was applied in order to find out about the relationship between the resulting factors and the students' classification according to scores for each of the sub-scales.

Results

Validation and reliability of the CTQ-items

We conducted several factor analyses in order to test the theoretical structure. The best solution (according to the KMO values, Bartlett's test and percentage of variance explained) was obtained through varimax rotation and the extraction method with principal components (KMO = 0.82; total variance explained = 45.57%). Regarding this solution, a clear empirical representation was observed according to the three theoretical conceptions initially proposed. In this respect, the three resulting factors were given the names: cooperative, individualistic and complementary conceptions. It is observed that they have appropriate reliability indices (see Table 1).

Regarding the first factor, items theoretically related to a conceptual definition close to a cooperative conception had factor loadings in items 3 / 4 / 7 / 10 / 13 / 16 / 17 and 18 (coefficient $\alpha = 0.74$), a total of eight items from the initially proposed nine items for this sub-scale. Concerning the second factor, items focused on a conceptual definition close to an individualistic conception had factor loadings in items 1 / 2 / 5 / 6 / 9 and 12 (coefficient $\alpha = 0.68$), a total of six items from the initially proposed nine items for this sub-scale. As for the third and last factor, an empirical structure linked to a conceptual definition close to a complementary conception had factor loadings in items 8 / 11 / 14 / 15 / 19 and 20 (coefficient $\alpha = 0.57$), a total of six items from the initially proposed nine items for this sub-scale. This last factor shows the lowest coefficient, but in general the results are quite adequate for a first version of the instrument.

Additionally, the Pearson correlation analysis indicates that the cooperative conception is significant and negatively related to the individualistic conception ($r = -0.59$; $p < 0.001$) as theoretically predicted (see Table 2). Likewise, a significant and negative relationship exists between the cooperative and complementary conceptions ($r = -0.19$; $p = 0.001$), and a significant but positive relation between the individualistic and complementary conceptions ($r = 0.31$; $p < 0.001$).

Finally, a cluster analysis was applied in order to classify students and to discover the domain pattern distribution according to the identified conceptions of teamwork. The descriptive analysis based on the mean and standard deviation allows us to construct three levels for each of the conceptions: high, intermediate and low. Scores that are above the mean (+1 SD) indicate a high level and scores

Table 1. Factor loading of CTQ scales in a 3-factor Varimax solution with principal component analysis; loading > −0.30 and < 0.30 omitted (N = 309).

Items	F1	F2	F3
1. The success in teamwork (based on one or few)		0.56	
2. The main contribution to a team... (leader)		0.54	
3. The main contribution to a team... (several subjects)	0.70		
4. In the teams, all of us take part in it...	0.52		
5. Teamwork is not useful for me...		0.64	
6. I prefer individual work...		0.77	
7. My work in a team is usually... (to be integrated)	0.59		
8. Teamwork helps me little...			0.60
9. When I work in a team... (divergences)		0.34	
10. When I work in a team... (harmony)	0.47		
11. Sometimes I prefer working in a team...			0.35
12. When I work in a team... (complications)		0.52	
13. I prefer working in a good team...	0.67		
14. When I work in teams... (some have clear ideas)			0.67
15. In the teams, some people do not take part in it...			0.67
16. In a team ... how to organise (all members share)	0.63		
17. Teamwork helps me... (learning)	0.43		
18. When I work in a team... (clarity)	0.64		
19. In a team ... how to organise... (some members)			0.60
20. Ideas in a team... (very different)			0.41

Notes: % explained variance = 45.57, F1: cooperative conception, F2: individualistic conception, F3: complementary conception (KMO = 0.82) (χ^2 Bartlett = 1387.59; $p < 0.000$).

Table 2. Pearson correlation between the CTQ sub-scales.

Conceptions (CTQ sub-scales)	1	2
1. Individualistic	–	
2. Complementary	0.31***	–
3. Cooperative	−0.59***	−0.19**

Note: * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

that are below the mean (−1 SD) a low level. In this respect, results show the existence of three clearly differentiated patterns (see Table 3).

The first cluster groups students having a higher score in the complementary conception ($N=114$; 37%) and an average score in both the individualistic and cooperative conceptions. These are students who say that they consider cooperative work to be positive and cooperate within their team, but they act in a complementary way. For example, adding information or dividing the task without really achieving the integration of the different members' contributions. According to the predefined level, students in this cluster have an intermediate level on all sub-scales but a better score on the complementary strand than students in the other two clusters. However, regarding the individualistic conception, they have a lower score than students in cluster three and, as for the cooperative conception, they have a lower score than students in cluster two.

The second cluster groups students with better scores in the cooperative conception ($N=91$; 29%). These students according to the predefined level on each sub-scale have low scores in both the individualistic and complementary conceptions. According to this result, we can clearly affirm that they are a cooperative group.

The third cluster groups a set of students with high scores in the individualistic conception and intermediate scores in the complementary conception, and a lower score in the cooperative conception according to the predefined levels ($N=104$; 34%).

Finally, we analysed the students' distribution in these last clusters according to gender and type of school. In relation to gender there are no differences in the distribution in the three clusters identified ($\chi^2=0.75$; $p=0.687$). Nevertheless, in relation to type of school we observe significant differences in the distribution ($\chi^2=25.01$; $p<0.001$) (see Table 4). In this respect, students in secondary schools in the city of Barcelona having a higher percentage (44%; standardised residual = 4.7) than those in the other two types of school (17% for the two schools in

Table 3. Clusters according to mean scores in the CTQ sub-scales.

Conceptions (sub-scales) Mean (SD)	Clusters 1 $N=114$	2 $N=91$	3 $N=104$	Statistical values F	p
Individualistic 12.23 (3.35)	11.48	9.60	15.28	125.39	<0.001
Complementary 19.36 (3.45)	21.65	15.85	19.96	120.47	<0.001
Cooperative 28.42 (4.79)	30.32	32.06	23.21	224.69	<0.001

Table 4. Type of school and clusters according to CTQ sub-scales (chi-squared).

Clusters	Type of school						χ^2	*P*
	Barcelona city		Barcelona surrounding		Girona village			
	N	%	*N*	%	*N*	%		
Individualistic	77	44	13	17	14	23	25.01	< 0.001
Complementary	52	30	33	44	29	49		
Cooperative	45	26	29	39	17	28		
Total	174	100	75	100	60	100		

the surrounding area of Barcelona and 23% for the village school in Girona) were distributed into the individualistic cluster, and students in the city of Barcelona having a lower percentage (30%; standardised residual = −3.20) than those in the other type of centres (44 and 49%, respectively) were distributed into the complementary cluster. Students from the surrounding area of Barcelona having a higher percentage (39%; standardised residual = 2.10) than those in the other schools (26% for schools in the city of Barcelona and 28% for the school village in Girona) were distributed into the cooperative cluster, and the schools in the surrounding area of Barcelona has a lower percentage of students distributed into the individualistic cluster (17%; standardised residual = −3.70) than the other types. In relation to the village school in Girona, most students were distributed into the complementary cluster (49%; standardised residual = 2.30).

Discussion

We conclude that the CTQ is a questionnaire with a high index of validity and a modest reliability. In this respect, we think that the CTQ should be improved by adding new items or dropping others to increase consistency, particularly regarding the complementary conception factor. Likewise, we think that the individualistic conception was interpreted in some cases as autonomous work, but our aim is to make this conception understood as an individualistic way of working together in teams. In this respect, we think that the CTQ theoretical and empirical structures could be revised and improved with other samples (European and Latin-American countries that share the same language as in Spain) to discuss possible cultural implications related to teamwork conceptions.

However, we think that this questionnaire shows a good theoretical and empirical representation of three specific conceptions of teamwork proposed in this work. Firstly, an individualistic conception sub-scale is identified, which is focused on the work of one of the team members or that of a leader who demands acquiescence; in both cases the team members confront divergences and difficulties in an individualistic way (Arvaja et al., 2002; Mercer, 1996) as the conversation is essentially one-sided uncritical knowledge sharing and disputational talk, respectively; and in line with Bakhtin's (1981) monological discourse.

Secondly, and along the same lines, we identify a complementary conception sub-scale in which working in groups mean that not all the team members participate in the same way and with the same intensity. Only few members contribute and, consequently, the integration of the team contributions is difficult because of

the diversity of the team members' opinions, of the prevalence of a division of tasks or of the lack of members' responsibility (Johnson et al., 1999).

Finally, the third conception identified is the closest to cooperative learning in which teamwork is considered a true integration and transformation of ideas and knowledge by all or nearly all the team members. This participation is characterised by harmony (understood as discussion and achievement of team consensus), clarity and a sense of shared learning.

The resulting general structure is similar to that reported by Arvaja et al. (2002) and Mercer (1996) and is inspired by two of the three learning structures by Johnson et al. (1978) that have also been used in other studies reviewed (Jules, 1992; Mulryan, 1994; Owens & Straton, 1980). Regarding Nagahama et al.'s (2009) results, two factors are similar as it was reported: the usefulness of cooperation and individual orientation, but not the inequity factor.

In relation to the correlation between sub-scales we think that it is relevant to comment that there is a close empirical relation between individualistic and complementary conceptions, and a negative relation between these two conceptions and the cooperative conception. Thus, it seems that from the theoretical point of view the cooperative conception adopts a very different nature because students having a higher score in the complementary and individualistic conceptions show lower agreement with a cooperative conception, and *vice versa*. Moreover, after having analysed the theoretical framework, cooperation also seems to adopt a different way of interacting with respect to the other two conceptions of interaction as it is the only one in which the co-construction of shared knowledge is achieved, which is a relevant argument to sustain that it is the best way to learn from groups. However, as we said above, it is necessary to apply this questionnaire on other samples in order to analyse more in depth its theoretical and empirical properties, preferably in relation with other motivational and cognitive factors, and in order to analyse the different implications of teamwork conceptions regarding other learning factors.

From the point of view of its application, we consider that this instrument can contribute to the optimisation of work within a team as it can provide relevant information in order to prevent difficulties in collaboration. Furthermore, if students' conceptions of teamwork are correctly identified with this instrument, future research should place emphasis on analysing the relationship between these conceptions and affective, social or cognitive factors involved in the group learning process (Monereo et al., 2011). For instance, in this study we did not find any differences in the distribution into different clusters according to gender, but it seems that there are interesting differences according to the type of school. In this respect, Barcelona city school students show a more individualistic pattern than students from a surrounding area of Barcelona or a village school. In this respect, we think that it is necessary to analyse this conception in relation to other social and cultural factors that can be used to understand more in depth the prevalent conceptions. A relevant question is: why were these patterns found? And what explains the different distribution found? We think that other studies in the educational psychology field have demonstrated there are a lot of combinations that could explain these patterns and their effects on other factors or *vice versa*. Personal, social and cultural factors are implicated in the learning processes and these show different combinations (patterns or profiles) according to students' expectations or context conditions. Thus, we think that conceptions of teamwork are linked to other learning factors in different ways, which has different effects on academic outcomes.

In sum, we think that this questionnaire is easy to apply and the results help us to make different types of groups (homogeneous or heterogeneous groups in different combinations) and to analyse the role of teamwork conceptions in academic outcomes. Additionally, we think that the CTQ is a potentially useful instrument to guide teachers and students towards conceptions and actions related to teamwork. Particularly, we think that it is necessary to identify individualistic students and to help them to change their beliefs about teamwork towards a cooperative conception. Likewise, cooperative students could help less cooperative students to change their belief. However, it would be interesting to understand how learning takes place in groups with different cooperative or complementary students (for example) when they have deep differences in the way that they process or regulate their learning activities defining different patterns.

We think this instrument should be completed with other data, e.g. with our daily observations of students regarding not only what they say, but also how they behave, which can provide us with information about their conceptions of teamwork. Likewise, research will advance in this field when more data are collected in authentic classroom settings (Blatchford et al., 2006).

According to Wang et al. (2009, p. 108), although 'various policy papers assert that teamwork is an essential skill for the twenty-first century workforce [. . .] outside of organizational psychology research with adult populations, there are few reliable assessments of this construct with suitable validity evidence for test scores'. It is evident that the assessment of students' conceptions and specifically of teamwork have been little explored and different lines of study may be investigated. For example, studying students' conceptions in relation to how they conceive learning, which has been proved to influence students' performance (Ellis, Goodyear, Calvo, & Prosser, 2008; Yang & Tsai, 2010), could be an interesting field of study that could give us useful clues to understand student behaviour when working in a team and help us to improve the teaching and learning processes. In addition, the relationship between students' representation of academic tasks and their learning conception could be another focus of interest within the group learning process. In fact, research by Loyens, Rikers, and Schmidt (2006, 2007a, 2007b, 2008, 2009) highlights that high levels of students' beliefs concerning constructivist conceptions of learning are linked to beliefs about the importance of cooperative learning or related to cooperative interaction. However, there are still many questions to be dealt within the field of conceptions.

Finally, it is necessary to stress that this work is an exploratory study in which we design and evaluate a new questionnaire to know the conceptions of teamwork by means of a Spanish sample. In this respect, further work will be necessary to improve this proposal and to analyse the effect of different patterns about teamwork conceptions on academic outcomes, time management in a team, co-regulation strategies and so on. Likewise, we think it will be interesting to analyse differences across cultural contexts and types of schools.

References

Arvaja, M., Häkkinen, P., Eteläpelto, A., & Rasku-Puttonen, H. (2000). Collaborative processes during report writing of a science learning project: The nature of discourse as a function of task requirements. *European Journal of Psychology of Education, 15*, 457–469.

Arvaja, M., Häkkinen, P., Rasku-Puttonen, H., & Eteläpelto, A. (2002). Social processes and knowledge building during small group interaction in a school science. *Project Scandinavian Journal of Educational Research, 46*(2), 161–179.

Bakhtin, M. (1981). *The dialogic imagination: Four essays*. Austin, TX: University of Texas Press.

Blatchford, P., Baines, E., Rubie-Davies, C., Bassett, P., & Chowne, A. (2006). The effects of a new approach to group work on pupil–pupil and teacher–pupil interactions. *Journal of Educational Psychology, 98*, 750–765.

Bonaiuto, M. (1997). Costruzione e validazione di una scala per la misura dell'atteggiamento verso la cooperazione [Construction and validation of a scale for measuring attitude toward cooperation]. *Giornale Italiano di Psicologia*, *24* (4), 833–870.

Boud, D., Cohen, R., & Sampson, J. (2001). Peer learning and assessment. In D. Boud, R. Cohen, & J. Sampson (Eds.), *Peer learning in higher education* (pp. 67–81). London: Kogan Page.

Brown, A.L., & Campione, J.C. (1990). Communities of learning and thinking: Or a context by any other name. *Contributions to Human Development, 21*, 108–126.

Buchs, C., Butera, F., & Mugny, G. (2004). Resource interdependence, student interactions and performance in cooperative learning. *Educational Psychology, 24*, 291–314.

Burdett, J. (2003). Making groups work: University students' perceptions. *International Education Journal, 4*(3), 177–191.

Cortese, C.G. (2005). Learning through teaching. *Management Learning, 36*(1), 87–115.

Duran, D., & Monereo, C. (2005). Styles and sequences of cooperative interactions in fixed and reciprocal peer tutoring. *Learning & Instruction, 15*, 179–199.

Ellis, R.A., Goodyear, P., Calvo, R.A., & Prosser, M. (2008). Engineering students' conceptions of and approaches to learning through discussions in face-to-face and online contexts. *Learning & Instruction, 18*, 267–282.

Erkens, G., Jaspers, J., Prangsma, M., & Kanselaar, G. (2005). Coordination processes in computer supported collaborative writing. *Computers in Human Behavior, 21*(3), 463–486.

Farmer, F. (1995). Voice reprised: Three studies for a dialogic understanding. *Rhetoric Review, 13* (2), 304–320.

Feldhusen, J.F., Dai, D.Y., & Clinkenbeard, P.R. (2000). Dimensions of competitive and cooperative learning among gifted learners. *Journal for the Education of the Gifted, 23*(3), 328–342.

Gillies, R. (2003). Structuring cooperative group work in classrooms. *International Journal of Educational Research, 39*, 35–49.

Guerin, B. (2003). Social behaviors as determined by different arrangements of social consequences: Diffusion of responsibility effects with competition. *Journal of Social Psychology, 143*(3), 313–329.

Henry, K. (2000). Perceptions of cooperation in a longitudinal social dilemma. *Small Group Research, 31*(5), 507–527.

Hijzen, D., Boekaerts, M., & Vedder, P. (2007). Exploring the links between students' engagement in cooperative learning, their goal preferences and appraisals of instructional conditions in the classroom. *Learning & Instruction, 17*, 673–687.

Järvelä, S., Näykki, P., Laru, J., & Luokkanen, T. (2007). Structuring and regulating collaborative learning in higher education with wireless networks and mobile tools. *Educational Technology & Society, 10*(4), 71–79.

Johnson, D.W., & Johnson, R.T. (1984). Structuring groups for cooperative learning. *The Organizational Behavior Teaching Review, 9*, 8–17.

Johnson, D.W., Johnson, R.T., & Holubec, E. (1999). *El aprendizaje cooperativo en el aula* [Cooperation in the classroom]. Barcelona: Paidós.

Johnson, D.W., Johnson, R.T., & Scott, L. (1978). The effects of cooperative and individualized instruction on students' attitudes and achievement. *Journal of Social Psychology, 104*, 207–216.

Johnson, D.W., Johnson, R.T., & Stanne, M.B. (2000). *Cooperative learning methods. A meta-analysis*. Retrieved May 23, 2010 from http://www.co-operation.org/pages/cl-methods.html.

Jules, V. (1992). Cooperative learning: Students perceptions of the changing structure of learning. *Contemporary Education, 63*(3), 191–194.

Kline, T.J.B. (1995). Cooperativeness and competitiveness: Dimensionality and gender specificity of the classroom life instrument. *Educational and Psychological Measurement, 55*(2), 335–339.

Leikin, R., & Zaslavsky, O. (1997). Facilitating student interactions in mathematics in a cooperative learning setting. *Journal for Research in Mathematics Education, 28*(3), 331–354.

Leinonen, P., Järvelä, S., & Häkkinen, P. (2005). Conceptualizing the awareness of collaboration: A qualitative study of a global virtual team. *Computer Supported Cooperative Work (CSCW), 14*(4), 301–322.

Loyens, S., Rikers, R., & Schmidt, H. (2006). Students' conceptions of constructivist learning: A comparison between a traditional and a problem-based learning curriculum. *Advances in Health Sciences Education, 11*, 365–379.

Loyens, S., Rikers, R., & Schmidt, H. (2007a). Students' conceptions of distinct constructivist assumptions. *European Journal of Psychology of Education, 22*(2), 179–199.

Loyens, S., Rikers, R., & Schmidt, H. (2007b). The impact of students' conceptions of constructivist assumptions on academic achievement and drop-out. *Studies in Higher Education, 32* (5), 581–602.

Loyens, S., Rikers, R., & Schmidt, H. (2008). Relationships between students' conceptions of constructivist learning and their regulation and processing strategies. *Instructional Science, 36*, 445–462.

Loyens, S., Rikers, R., & Schmidt, H. (2009). Students' conceptions of constructivist learning in different programme years and different learning environments. *British Journal of Educational Psychology, 79*, 501–514.

Martínez-Fernández, J.R., Duran, D., Corcelles, M., Fuentes, M., & Cerrato, M. (2009, August). *Conceptions about the teamwork questionnaire (CTQ): A survey to know the high school students' beliefs*. Poster presented at the EARLI Conference, Amsterdam.

Mason, L. (2001). Introducing talk and writing for conceptual change: A classroom study. *Learning & Instruction, 11*, 305–329.

Meloth, M.S., & Deering, P.D. (1999). The role of the teacher in promoting cognitive processing during collaborative learning. In A.M. O'Donnell & A. King (Eds.), *Cognitive perspectives on peer learning: The Rutgers invitational symposium on education series* (pp. 235–255). Mahwah, NJ: Lawrence Erlbaum Associates.

Mercer, N. (1996). The quality of talk in children's collaborative activity in classroom. *Learning and Instruction, 6*, 359–389.

Monereo, C., Castelló, M., Martínez-Fernández, J.R., & Gutiérrez-Braojos, C. (2011). *¿Éste grupo trabajará cooperativamente? Variables predictoras con estudiantes de secundaria* [This group will work in cooperative way? Predictors variables with secondary students]. In J.M. Román, M.A. Carbonero, & J.D. Valdivieso (Eds.), *Educación, aprendizaje y desarrollo en una sociedad multicultural* [Education, learning and development in a multicultural society] (pp. 2083–2097). Valladolid: Asociación Nacional de Psicología y Educación.

Mugny, G., & Doise, W. (1983). *La construcción social de la inteligencia* [The social development of the intellect]. México: Trillas.

Mulryan, C.M. (1994). Perceptions of intermediate students' cooperative small-group work in mathematics. *Journal of Educational Research, 5*(87), 280–291.

Nagahama, F., Yasunga, S., Sekita, K., & Kouhara, S. (2009). Development of a scale to measure belief in cooperation. *Japanese Journal of Educational Psychology, 57*(1), 24–37.

Neber, H. (1994). Development of a scale for cooperative and competitive learning preferences. *Psychologie in Erziehung und Unterricht* [Psychology in Education and Teaching]*, 41*(4), 282–290.

OECD (Organisation for Economic Co-operation and Development). (2002). *Definition and selection of competencies: Theoretical and conceptual foundations (DeSeCo)*. Retrieved from www.deseco.admin.ch

O'Neil, H., Chung, G., & Brown, R. (1997). Use of networked simulations as a context to measure team competencies. In H. O'Neil (Ed.), *Workforce readiness. Competencies and assessment* (pp. 205–228). Mahwah, NJ: Lawrence Erlbaum Associates.

Ortiz, A.E., Johnson, D.W., & Johnson, R.T. (1996). The effect of positive goal and resource interdependence on individual performance. *The Journal of Social Psychology, 136*(2), 243–249.

Owens, L., & Straton, R.G. (1980). The development of a cooperative, competitive, and individualized learning preference scale for students. *British Journal of Educational Psychology, 50*, 147–161.

Palincsar, A.S., & Brown, A.L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction, 1*(2), 117–175.

Phipps, M., Phipps, C., Kask, S., & Higgins, S. (2001). University students' perceptions of cooperative learning: Implications for administrators and instructors. *The Journal of Experiential Education, 24*(1), 14–21.

Prichard, J.S., Stratford, R., & Bizo, L. (2006). Team-skills training enhances collaborative learning. *Learning & Instruction, 16*, 256–265.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York, NY: Oxford University Press.

Rogoff, B., Matusov, E., & White, C. (1996). Models of teaching and learning: Participation in a community of learners. In D. Olson & N. Torrance (Eds.), *Handbook of Education and Human Development: New Models of Learning, Teaching, and Schooling* (pp. 388–414). London: Blackwell.

Rose, I., & McCaslin, M. (2008). Student perceptions of small-group learning. *Teachers College Record, 11*(110), 2438–2451.

Sharan, Y. (2010). Cooperative learning for academic and social gains: Valued pedagogy, problematic practice. *European Journal of Education, 45*(2), 300–313.

Simmons, C.H., Wehner, E.A., Tucker, S.S., & King, C.S. (1988). The cooperative/competitive strategy scale: A measure of motivation to use cooperative or competitive strategies for success. *The Journal of Social Psychology, 128*(2), 199–205.

Simsek, A., & Tsai, B. (1992). The impact of cooperative group composition on student performance and attitudes during interactive videodisc instruction. *Journal of Computer-Based Instruction, 19*(3), 86–91.

Slavin, R. (1996). Research for the future. Research on cooperative learning and achievement: What we know, what we need to know. *Contemporary Educational Psychology, 21*, 43–69.

Stevens, M., & Campion, M. (1999). Staffing work teams: Development and validation of a selection test for teamworking settings. *Journal of Management, 25*(2), 207–228.

Szostek, C. (1994). Assessing the effects of cooperative learning in an honors foreign-language classroom. *Foreign Language Annals, 27*(2), 252–261.

Topping, K. (2005). Trends in peer learning. *Educational Psychology, 25*(6), 631–645.

Topping, K., & Ehly, S. (1998). *Peer assisted learning*. Mahwah, NJ: Lawrence Erlbaum Associates.

UNESCO/OREALC. (2002). *¿Qué; Educación Secundaria para el Siglo XXI?* [What secondary education for the 21st century?]. Chile: Andros Ltda.

Van den Bossche, P., Gijselaers, W.H., Segers, M., & Kirschner, P.A. (2006). Social and cognitive factors driving teamwork in collaborative learning environments: Team learning beliefs and behaviours. *Small Group Research, 37*(5), 490–521.

Vigotsky, L. (1978). *Mind in society: Development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Walker, A. (2001). British psychology students' perceptions of group-work and peer assessment. *Psychology Learning and Teaching, 1*(1), 28–36.

Wang, L., MacCann, C., Zhuang, X., Liu, O., & Roberts, R.D. (2009). Assessing teamwork and collaboration in high school students: A multimethod approach. *Canadian Journal of School Psychology, 24*(2), 108–124.

Waugh, R.F., Bowering, M.H., & Chayarathee, S. (2005). Creating scales to measure reading comprehension, and attitude and behaviour, for prathom 6 (grade 6) students taught ESL through a cooperative learning method in Thailand. In R.F. Waugh (Ed.), *Frontiers of educational psychology* (pp. 183–219). New York, NY: Nova Science.

Webb, N.M. (1989). Peer interaction and learning in small groups. *International Journal of Educational Research, 13*(1), 21–39.

Wertsch, J.V. (1991). *Voices of the mind. A sociocultural approach to mediated action*. Cambridge, MA: Harvard University Press.

Whicker, K.M., Bol, L., & Nunnery, J.A. (1997). Cooperative learning in the secondary mathematics classroom. *Journal of Educational Research, 91*(1), 42–48.

Yang, Y.F., & Tsai, C.C. (2010). Conceptions of and approaches to learning through online peer assessment. *Learning & Instruction, 20*, 72–83.