



## **ANALYSIS OF THE DEGREE OF COOPERATIVITY OF A PRIMARY EDUCATION CLASSROOM GROUP IN CATALONIA (SPAIN)**

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### **To cite this article:**

Romero, G. R. (2023). Analysis of the Degree of Cooperativity of a Primary Education Classroom Group in Catalonia (Spain). *Autonomy and Responsibility Journal of Educational Sciences* 8(2). 41-58. DOI: [10.15170/AR.2023.8.2.3](https://doi.org/10.15170/AR.2023.8.2.3).

**To link to this article:** <https://doi.org/10.15170/AR.2023.8.2.3>.

# Analysis of the Degree of Cooperativity of a Primary Education Classroom Group in Catalonia (Spain)

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*Integration is one of the key challenges facing educational systems as they strive to offer quality education that not only promotes academic progress but also fosters coexistence in an increasingly plural and diverse society. From this perspective, one of the most significant changes that must be made involves shifting the traditional role of the teacher as a mere transmitter of information and granting a leading role to students in their own teaching and learning process. In this context, the importance of cooperative learning methodology is highlighted. However, it is important to note that not all teamwork is truly cooperative. To determine the quality of cooperation, it is crucial to measure the degree of cooperativeness of teams. This degree refers to the effectiveness of teamwork, where the higher this degree, the more effective both the team and the work they carry out will be. Essentially, the degree of cooperativeness is evaluated considering two aspects: the frequency of teamwork and the quality of teamwork. The present research focuses on explaining the procedure for calculating the degree of cooperativeness, as well as presenting the instrument designed for this purpose. Additionally, the results of its application are presented, which were carried out with a group of male and female students in third and fourth year of primary education. This instrument is the result of various projects developed in the Research Group on Attention to Diversity (GRAD) at the University of Vic-Central University of Catalonia (Spain). The objective of this article is to present the analysis of the degree of cooperativeness of a primary education class group over two consecutive courses using an instrument (endorsed in subsequent studies, Pujolàs, 2009) with the purpose of identifying to what extent the students' work has the quality of being cooperative.*

**Keywords:** *cooperative learning, degree of cooperativeness, inclusion*

## Introduction

Reports issued by certain international entities, such as the United Nations (UN), in their publication entitled “The Convention on the Rights of Persons with Disabilities (CRPD) of 2019”, have consistently highlighted the urgent need to improve two fundamental indicators concerning the quality of our national education system. These indicators focus on the effective inclusion of the most vulnerable and at-risk students, as well as the persistent issue of educational failure, which is clearly manifested through early dropout rates in educational and training pathways.

The urgency to improve inclusive policies has led to the development of reports by experts in the field, such as the work carried out by Echeita et al. (2019). These reports have underscored the pressing need to intensify inclusion policies in order to approach the inclusion standards adopted by nations in our environment, while also addressing certain educational practices that have proven to be less inclusive within our education system.

Thus, the educational institution, as one of the agents responsible for fostering and developing competencies in students, has been immersed in a process of reconfiguration to adapt to emerging challenges in contemporary society. One paradigmatic aspect of this transformation is the incorporation of active methodologies, which conceive the learning process as an active and dynamic experience, wherein the student assumes a central role as its protagonist, such as cooperative learning methodology (Juárez et al., 2019).

In contrast to modalities characterized by an individualistic and competitive orientation, the cooperative approach presents notable advantages (Pujolàs, 2008). This strategy promotes inclusion in terms of presence, participation, and progress, as evidenced by findings supported by previous research (Gaudet et al., 2010; Johnson et al., 2014; Poort et al., 2023).

Cooperative learning is an important tool for eliminating or minimizing barriers that limit the learning and participation of all students. Many students experience difficulties because their differences in teaching and learning processes are not taken into account. Various social groups, ethnicities, and cultures have different norms, values, beliefs, and behaviors, which are generally not part of the school culture, thus limiting their learning and participation possibilities, or leading to exclusion and discrimination (Ainscow and Booth, 2000).

Current research on cooperative learning also demonstrates advantages in improving problem-solving skills and challenges, while facilitating students’ personal initiative and giving them greater control over their learning processes. Ultimately, this cooperative strategy promotes the development of metacognitive skills related to autonomous management of the learning process, allowing the transition from a conception of learning as an individual process to a model of situated and distributed learning (Cañabate i Colomer et al., 2020; Shpeizer, 2019).

This article aims to evaluate the degree of cooperativeness of a class team from a primary school in Catalonia when working in cooperative teams based on an educational program to incorporate cooperative learning in the classroom called “Programa CA/AC (“Cooperar per aprendre/Aprender a cooperar”)”, developed by the GRAD (Research Group on Attention to Diversity) of the University of Vic-Central University of Catalonia.

The article is structured into different sections. In the first section, we revisit some conceptual aspects of cooperative learning and the degree of cooperativeness, as well as the main factors that, in our opinion and based on previous research results, identify a cooperative learning team that determines the degree of cooperativeness. In the second section, we present the research objectives, methodology used, as well as the procedure

and instrument for calculating the degree of cooperativeness of a team and/or class group. Finally, we present the results and discussion.

## **The theoretical Framework**

### *The importance of cooperative learning in the teaching and learning process*

Currently, we live in an increasingly pluralistic society, both socio-culturally and ethnically. Cooperative learning and teamwork are essential tools for addressing current educational and social challenges (Gillies, 2014), as they enable interaction based on differences towards better situations and respond to the diverse individual needs of different people and groups, along with other actions (Thurstone, et al., 2017). Cooperative learning is necessary in the classroom because there still exists a traditional school system based on teacher-centred learning, which directs students by establishing one-way communication with them. In this approach, knowledge comes solely from a single authoritative source on the subject being taught, without considering how students should assist each other in the teaching and learning process. Teachers require extensive training (Buchs & Butera, 2015) to create interactions among students so they can assist each other.

Cooperative Learning (CL), in particular, represents an active methodology in which students collaborate in small groups to enhance their knowledge acquisition process, while fostering the development of their social skills, promoting the inclusion of all participants, and contributing to reducing bullying situations (Abellán, 2019). However, although students participate in various teamwork activities during their education, these experiences alone do not guarantee the development of the necessary skills to effectively collaborate in group settings (Rodríguez-Sandoval et al., 2010). Competence in teamwork is acquired through a process involving the acquisition of various skills, which is challenging to address if not planned systematically and transversely throughout the different courses that comprise an academic program. Additionally, it is essential for students to receive well-founded feedback on their performance in teamwork throughout this period (Martínez-Gómez & Marin-García, 2009).

Contributions from various authors demonstrate that cooperative learning is a methodology that positively impacts motivation to learn, intergroup relations, critical and creative thinking, and problem-solving, among other good practices (Balonche & Brody, 2017). Cooperative learning is a form of social organization of teaching and learning situations in which individuals establish positive interdependence and achieve their goals only if their peers do too (Onrubia & Mayordomo, 2015). People work together to maximise their own and each other's learning (Johnson et al., 1999). In this sense, cooperative learning is based on learning together as a team (Dillenbourg, 1999; Slavin, 2014). Cooperative work expands students' field of experience and improves their communication skills by training them to recognise others' viewpoints, enhancing teamwork skills, either to defend their own arguments or to change their minds if necessary.

Positive interdependence, where the achievement of group goals depends on the coordinated work that group members are capable of, is crucial. It involves designing tasks so that each group member is responsible for the learning of others, as no one possesses all the necessary information. According to Johnson et al., (1999), this interdependence is crucial as true cooperation cannot exist without it. To achieve this, Pujolàs (2009) suggests designing activities that allow everyone to contribute to the group's success and promote strong interdependence in roles, tasks, objectives, and outcomes.

Equitable and rotating role distribution is essential for everyone to practise and learn different functions, with each member's responsibility being key to the team's smooth functioning. Task interdependence involves dividing the material among members, requiring each to master their part and explain it to the group. This structure significantly enhances intrinsic motivation, as everyone feels useful, regardless of their level of knowledge. Positive interdependence is considered the core of cooperative learning (Johnson et al., 1999). Face-to-face interaction is deemed a more relevant factor than positive interdependence for achieving good results in cooperative learning. According to Gillies (2003a, 2003b), this type of interaction gives students the opportunity to engage in discussions in small groups, enabling them to learn to interpret non-verbal language, respond to social cues, and participate in the task more effectively.

Individual responsibility in cooperative learning is of utmost importance to avoid the risk of some students taking advantage of others. To mitigate this risk, it is essential to design tasks so that all group members share responsibility for the final outcome and improve their achievements (Alghamdi & Gillies, 2013).

Students must also learn social and interpersonal skills for proper leadership development, decision-making, fostering a climate of trust, communication, and conflict resolution, although it is also true that these skills are learned through cooperation (Gillies 2003a, 2003b, 2004, 2006, 2007). Group and individual self-assessment are essential for individual and group reflection and decision-making for improvement (Buchs et al., 2017). Equitable participation and equal opportunities for success are important for advancing their learning and contributing to their ultimate success (Kagan, 1992).

It is worth noting the heterogeneity in group formation, in terms of gender diversity, skills, and cultural background, among others. This is based on the heterogeneity of society, as each individual will bring different experiences and perspectives to the group. These elements and their characteristics can be a starting point for obtaining criteria to analyse and measure the degree of cooperation.

### *The quality of teamwork*

The degree of cooperation of a collective (team or class group) indicates to what extent this collective possesses the quality (the attribute) of being cooperative and to what extent it achieves or accomplishes what is expected of it by virtue of being cooperative. It allows us to determine, in relation to other collectives, whether the work it performs is of higher quality or not, depending on whether it exceeds or falls below the average degree of cooperation of a set of different collectives. The degree of cooperation, therefore, refers to the effectiveness of teamwork: the higher the degree of cooperation, the more effective the team and the work it performs, and the greater the benefits obtained from teamwork due to having the quality of being cooperative (Pujolàs, 2008).

The quality index, in turn, numerically indicates to what extent a team possesses the quality of being cooperative, whether the factors that make it truly cooperative are present to a greater or lesser degree. However, for teamwork to be truly cooperative, the time during which students work cooperatively is also important.

Therefore, if we are interested in analyzing teamwork within a class group to relate this teamwork to the potential benefits of cooperative learning, we must consider two levels of analysis: a quantitative level (the amount of time dedicated to teamwork) and a qualitative level (the quality of the teamwork performed).

The degree of cooperation of a team or class group, therefore, depends on the amount of time they have been working as a team and the quality index of the teamwork they perform.

### *Key Factors of a Cooperative Team*

Based on the contributions of Johnson and Johnson (1997) and Johnson, Johnson, and Holubec (2013), as well as Kagan (2009), we have identified the factors that characterize a cooperative learning team, also described by Pujolàs (2008). These are:

- Positive interdependence: Positive interdependence of goals, positive interdependence of tasks, positive interdependence of resources, positive interdependence of roles.
- Equal opportunities.
- Simultaneous face-to-face interaction.
- Individual responsibility.
- Self-assessment and goal setting for improvement.

If we ensure the development of these factors, the results of cooperative learning can be classified into three different categories. The first category refers to the development of effort to achieve a common good. This category includes superior performance by all students and greater productivity, leading to higher intrinsic motivation, better long-term memory, motivation to achieve high performance, more time devoted to tasks, a higher level of reasoning, and critical thinking. The second category includes the development of social skills for teamwork and positive appreciation of diversity, as well as greater team cohesion. The third and final category refers to improvement in increased team spirit, strong and committed relationships, personal and school support, positive evaluation of diversity, and cohesion.

Each of these factors is associated with a counterfactor, whose presence, instead of increasing quality and, therefore, the effectiveness of teamwork, reduces it, and as a result, its effectiveness as well.

Therefore, the degree of cooperation of a team indicates to what extent a team possesses the quality (the attribute) of being cooperative and to what extent it achieves what is expected of it as a result of being cooperative. It allows us to know in relation to other teams whether the work they perform is of higher quality or not, depending on whether it exceeds or does not exceed the average degree of cooperation of a set of different teams. The degree of cooperation refers to the effectiveness of teamwork: the higher the degree of cooperation, the more effective the team and the work it performs, and the greater the benefits obtained from teamwork due to having the quality of being cooperative (Pujolàs, 2008).

On the other hand, the quality index numerically indicates to what extent a team has the quality of being cooperative. It will be more or less cooperative if the factors that give it this quality are present in it to a greater or lesser degree, which means that it is a more or less cooperative team. In other words, it depends on the factors that make it more or less effective in achieving what is expected of it as a result of having the quality of being cooperative. The quality index refers to the quality of the team itself: a high-quality index means that a team has a higher degree of cooperation. However, if the work produced by this team is effective (which is equivalent to saying that this team has a high degree of cooperation) also depends, as we will see later, on the time dedicated to teamwork, not just on the quality of the team itself (that is, it does not depend solely on having a high-quality index).

To calculate this quality index, we have focused on the following cooperation factors (or factors of quality of a cooperative learning team), which will be described in more detail later:

- Positive interdependence of goals.
- Positive interdependence of roles.
- Positive interdependence of tasks.
- Stimulating face-to-face interaction.
- Social skills for group work.
- Team self-assessment and goal setting for improvement.

Each of these factors can have an associated counterfactor, whose presence, instead of increasing quality, decreases it, and therefore reduces its effectiveness. It is one thing for a team to be more or less organized (it will be if there is positive interdependence of roles and tasks among its members), and another thing for it to be “disorganized.” It is one thing for the students of a team to make an effort to achieve the team’s goals because their team “succeeds” (in this case, there is positive interdependence of goals among them), or for someone to make an effort to ensure that their team “fails.”

In the next section, each of the six quality factors of a cooperative learning team that we have just mentioned (which, being a cooperative learning team, can also be called cooperation factors) and their corresponding counterfactors, which will be taken into account when calculating the quality index of a cooperative team. With the joint and continuous consideration of a factor and its corresponding counterfactor, a succession of situations can be established, ranging from minimum quality (rated as 0) to maximum quality (rated as 6). In this succession, the intermediate situation (rated as 3) indicates a fairly neutral situation in which the counterfactor is not present, but the factor is not fully present either, or is present to a very incipient degree, which would make the quality of the team begin to be significant.

The quality index is obtained as the arithmetic mean of the assessment given to each of the cooperation factors, and their corresponding counterfactors, which have been considered for a team at a given time: Quality Index Level Score (average) Low 0-2, Medium 2-4, High 4-6.

### *Factors and Counterfactors of Quality*

The quality factors to be taken into account to calculate the quality index along with their corresponding counterfactors are as follows:

1. Positive interdependence of goals: Team members help each other learn.  
Counterfactor: Some sabotage team progress.
2. Positive interdependence of roles: Roles are rotated for balance. Counterfactor: Imposed or static roles.
3. Positive interdependence of tasks: Agreed-upon tasks for joint learning.  
Counterfactor: One does everything while others watch.
4. Stimulating face-to-face interaction: Learning from others’ ideas and suggestions.  
Counterfactor: Negative discussions and lack of collaboration.
5. Social skills for group work: Effective communication and conflict resolution.  
Counterfactor: Lack of social skills, or misuse.
6. Team self-assessment and goal setting: Regular assessment and improvement goals.  
Counterfactor: Negative self-assessment or counterproductive goals.

The degree of cooperation, therefore, depends on two main factors: the percentage of cooperative AA segments, on one hand, and the quality index of teamwork, on the other. The higher these two elements are, the greater the degree of cooperation of a specific team.

On the other hand, if only one of these two elements equals 0 (0% teamwork or a quality index = 0), the degree of cooperation will also be 0. If the quality index of teamwork is acceptable, but in practice there is no teamwork (0%), it is evident that we cannot attribute the label “cooperative” to the team in question, as they will not achieve what is expected of them precisely because they are not cooperative. Similarly, if some time is dedicated to teamwork, but the quality index of teamwork is 0, the team cannot be considered “cooperative” either, and we cannot expect them to achieve what is normally expected from cooperative work. In reality, there has been no effective teamwork (only four individuals working individually or not, side by side...).

However, the two elements considered in the above formula do not have the same specific weight. We believe that the most significant factor is the quality of teamwork, expressed by the quality index of teamwork, rather than the amount of time dedicated to teamwork during a Didactic Unit, expressed by the percentage of cooperative AA segments. In other words, we consider it more important to ensure the quality of teamwork (so that the team has the attribute of cooperation to the maximum) than the amount of time dedicated to teamwork. Working “poorly” as a team for a long time is less effective than working “well” as a team for a shorter period. A team cannot have the same degree of cooperation in the first case (working “poorly” for a longer time) as in the second case (working “well” for a shorter time).

Therefore, although the degree of cooperation could be expressed, as mentioned earlier, as a percentage of the quality index of a specific team, this formula would give excessive importance to the quantitative aspect (the amount of time, the percentage they work as a team) at the expense of the qualitative aspect (the quality of teamwork determined by its quality index). To avoid this bias, we have decided to apply a correction factor to the initially considered formula, so that the percentage used to calculate the degree of cooperation is not applied to the entire quality index, but only to a part. The higher this correction factor, the more importance will be given to the quality index when calculating the degree of cooperation.

## Methodology

The research is based on qualitative methodology. Specifically, it is a descriptive study focused on Case Study (Stake, 1995), in order to verify to what extent, the proposed strategies have led to an increase in the cooperativeness degree of the teams.

### *Study Context*

The participants in the study are the same group of students when they were in second and then third grade. The objective was to monitor them to see if the degree of cooperativeness of their teams improved while the CA/AC Program (Cooperate to Learn/Learn to Cooperate) was implemented, based on a series of actions to implement cooperative learning in the classroom.

Before the implementation of the program, the educational response provided by the teacher, for student attention in general, was based on a clearly individualistic option typical of a traditional approach. In this sense, the teacher found it difficult to attend, at certain times, to students who face barriers to participation and learning, as well as to students who have more deficiencies and difficulties, since she does not have sufficient resources or time to adjust the educational response to all students in the class group. Due to these limitations, this type of students could not perform or participate in the same



activities as the rest of the students. The teacher perceived this as a problem, and it is perhaps for this reason that she sees the need to know and use other methodologies to better address diversity, one of which is the methodology of cooperative learning. This individualistic approach also conditions the type of relationships among students. From this perspective, the classroom teacher tells us that students always tend to be part of a group, either to work with them or to maintain their relationship outside the school. Regarding those students who have more difficulties –especially newcomers– they also form a group among themselves, so there is no overall class group cohesion.

But if we analyze the relationships of the students within the subgroups, we will see that they are not too favorable either. The teacher explained to us that there are problems in the functioning of these groups if any of the members does not finish the work, or if there is a student who imposes on others by assuming a leadership role. This results in students choosing their peers when it comes to working, prioritizing the academic potential they have rather than other more personal and individual aspects that have nothing to do with academic results.

The classroom climate and predisposition to work are often determined by these types of relationships, as the teacher suggests. Therefore, these elements are only determined by how students perform their work, probably due to the individualistic structure-based approach used.

The school, for the practical evaluation of students, gives more importance to academic performance. That is, it prioritizes the results obtained from the achievement of content, and not so much attitudes and social skills, which are also necessary for the proper personal and individual development of students. The prioritization in the achievement of more academic content is markedly determined by the teaching and learning structure carried out in the classroom. That is why the teacher pays more attention to the individual progress made by the student in relation to academic content, and not so much the progress or what he learns when interacting with his peer group. Before introducing cooperative learning in the classroom, the classroom teacher received training on the CA/AC program. The research question and the objectives of our research are as follows:

Do interventions of a didactic program based on a cooperative structure that we have called CA/AC Program (“Cooperate to Learn/Learn to Cooperate”) – consisting of a set of actions available to primary education teachers to teach their students to learn as a team, cooperatively, have the quality of being cooperative?

The objectives derived from the general hypothesis are:

1. Analyze the degree of cooperativeness of the teams and the class group in which cooperative work has been carried out using the CA/AC Program (Cooperate to Learn/Learn to Cooperate).
2. Verify if there have been changes in the degree of cooperativeness during these two courses, comparing the results.
3. Identify factors to be improved and determine improvements.

### *Data Collection and Analysis Instruments*

As we mentioned in the previous sections, to calculate the degree of cooperativeness, we need to know the frequency of teamwork (the % of time students have worked in teams during a specific period) and the quality index achieved by a team at the end of a specific period of time.

To calculate the frequency, we used an observation guideline with the aim of recording the total minutes of each class session in which students worked in teams. We calculated this frequency ourselves, throughout the sessions in which the cooperative units were developed, and for both academic years, attending each of the scheduled sessions.

As for the quality index of teamwork, we developed an observation table for each of the quality factors (and for each of the corresponding counterfactors) defined earlier, with the description of seven successive situations ranging from a maximum presence of the corresponding counterfactor (and therefore, minimal quality), scored with a 0, if the degree of cooperativeness is  $=$  or  $> 4$ , to a maximum presence of the factor (and therefore, maximum quality), scored with a 6. In this succession, the intermediate situation, scored with a 3, indicates that the counterfactor is not present, but neither is the quality factor properly present or, in any case, only present in a very incipient way. Through these tables, each of the teams in a class group is analyzed, determining, for each of the 6 considered quality factors, in such a way that:

- A score  $=3$  indicates the absence of the quality factor, or a very incipient presence of this factor.
- A score  $>3$  indicates the presence of the factor with progressively higher frequency and quality.
- And a score  $<3$  corresponds to the presence of a counterfactor with progressively higher frequency and (negative) quality.

The score awarded to each team for each of the 6 quality factors considered is recorded on an appropriate sheet.

The quality index achieved by each team at a given time is equivalent to the arithmetic mean of the scores awarded by the observer to this team in each of the 6 factors considered. The Research Team has developed a spreadsheet where only the quantity of time worked in teams in each class session needs to be entered on one side, and on the other side, the scores awarded to each team for each of the 6 quality factors. The spreadsheet automatically calculates the % of teamwork, the quality index of each team, the degree of cooperativeness of each team, and the degree of cooperativeness of the class group. It should be noted that before testing it with the group focused on in our research, we wanted to make an initial application of the calculation to understand its operation well and detect possible inconveniences. This application, with the correction factor adjustment, was positive.

As for our experience, when the observer (in our case, the tutor of the group of students in which the CA/AC Program has been applied) analyzes each of the teams through these tables, they do not evaluate each team to see if they “pass” or “fail”, and with what “grade”, the “teamwork” content, but they try to make a “diagnosis”, a “radiography” of the level of quality of the team’s work, in each of the factors, not at the moment of the evaluation, but of the level achieved up to that moment, regardless of whether that day they work better or worse as a team.

## *Results*

Regarding the 2nd year of Primary Education, corresponding to the academic year, we analyzed 60 sessions of program implementation in the language arts area. The total percentage of teamwork time is 46.04%.

As for the analysis of the quality index of the teams, we administered the questionnaire for factor analysis twice. The first was before the implementation of the programming unit. The other was after applying the program. As for the third year of primary education with

the same group, we analyzed 50 sessions of cooperative work. The area in which it was applied was mathematics. The results obtained are as follows (Table 1 and Table 2):

AC Segments (% cumulative)	34,7%	46,0%
	Period	Period
	5-feb	28-may
<b>Quality factors</b>		
A: Goals	1,83	3,17
B: Roles	3,00	3,67
C: Tasks	3,33	4,67
D: face to face interaction	2,67	4,83
E: Social skills	1,83	4,50
F: self-assesment	3,00	4,33
Quality index	2,61	4,19
<b>Degree of Cooperativeness</b>	1,59	2,84
	Low	Acceptable

*Table 1: Qualitative analysis and degree of cooperation of the class group. Results of the 2nd year of primary education*

AC Segments (% cumulative)	39,1%	55,1%
	Period 1	Period 2
	22-feb	18-abr
<b>Quality factors</b>		
A: Goals	3,57	4,29
B: Roles	3,71	4,29
C: Tasks	3,71	4,71
D: face to face interaction	3,71	4,57
E: Social skills	4,00	4,29
F: self-assesment	3,86	4,29
Quality index	3,76	4,40
<b>Degree of cooperativeness</b>	2,39	3,22
	Acceptable	High

*Table 2: Qualitative analysis and degree of cooperativeness. Results of the 3rd year of primary education*

If we compare the results obtained in the two courses, we will see that there have been significant improvements in certain factors and not in others. Overall, we have observed that the group has been acquiring greater positive interdependence, meaning that it has been achieving a learning situation in which it relies on the actions of each team member. Thus, each boy and girl has become aware that their learning depends on the learning of the other team members, and at the same time, that the learning of the rest of the classmates

depends on their own learning. To see this improvement, I will analyze the results derived from the interdependence of goals, roles, and tasks.

Regarding the interdependence of goals, which refers to the ability of students to learn what is taught to them and also contribute to teaching the rest of their classmates, there has been a considerable improvement: at the end of the third year, the average index of quality for all teams was 4.29, while in the second year it was 3.17. This difference can be directly related to the fact that practice has accustomed students to be clear about the objectives proposed from the beginning at both an individual and group level. In this sense, the team has progressed in a dual responsibility: learning what the teacher has taught them to the best of their ability and ensuring that the rest of their classmates also learn. Thus, it is evident, as we discussed in the theoretical framework, that cooperative learning is not only a method but also a content to be learned.

In terms of the interdependence of roles, there has also been a clear improvement. While in the second-year course, the average index of quality for all teams in this factor was 3.67, during the third year it increased to 4.29. In this aspect, students have a clear understanding of the roles that team members must perform, likely because they have internalized the structure of teamwork. In this sense, working with team notebooks has somehow obliged them to fulfill their roles and adhere to work norms, some of which referred to fulfilling their roles. However, it would be necessary to see to what extent each member individually fulfilled their role; which roles presented more difficulties and why (what were the causes), etc. Nevertheless, as we know, this is not the purpose of the thesis but rather to see the progress or lack thereof in all factors. However, in general, the role or position assigned to each team member also conditions the team's achievement of the dual purpose (learning content and learning to work as a team), and this has improved over the two years.

These roles have influenced the improvement of team functioning. This also means that, in general, the teacher has been able to operationalize them, that is, to explain and adjust them for all students.

As for the factor of task interdependence, understood as the coordination of the different tasks to be carried out by each member and the better they do it, there has also been an improvement. In this sense, the individual task or learning that each member has carried out has benefited the others, while each individual has learned thanks to the individual contribution of the other members. In this factor, there has been an increase from 4.67 to 4.71 in the average index of quality for all teams.

In summary, this learning, perhaps more individual but conditioning group work and group functioning, that is, the development of interdependence of goals, roles, and tasks, are the factors in which the score has improved the most.

The remaining factors (face-to-face interaction, development of social skills, and self-assessment) have experienced a slight setback during the third year, but nothing significant, as we have seen.

Regarding face-to-face interaction, understood as a communication phase that promotes relationships among classmates and fosters learning, the change has been only a few tenths. It is important to note that the starting score for this factor in the previous course was already high (4.83), and in this course, it has decreased to 4.53, with a very small difference.

This factor, on the other hand, was generated from the beginning based on the various group dynamics that the teacher applied in the classroom. What has been more difficult to advance, as we mentioned earlier, are the factors that refer to the functioning and organization of teams.

As we know, interactions between students and teachers are mainly promoted. It is not so common for interactions among students themselves to be explicitly promoted in the classroom. It often happens quite the opposite. Only on rare occasions do students work

together, and learning is basically considered an individual function. However, it has been demonstrated that when a student interacts with another to explain what they have learned, in addition to developing communication skills, they are forced to organize their ideas, refine their knowledge, and perceive their mistakes and gaps.

These cognitive processes undoubtedly favor their learning. Although the development of this skill has not been considerable, unlike others, the final score obtained is very good (4.57).

There has been no improvement in the self-assessment factor either. It has decreased from 4.33 to 4.29. But this final score is quite good. The group assessment gives cohesion to the group. This self-assessment has been twofold:

- Group assessment by the teaching staff.
- Group self-assessment: to what extent are they achieving the objectives and maintaining a good relationship among themselves.

But these results indicate that initially, during the second year, the score for this factor was already high, specifically 4.33. This is a good result because it shows that the group has had from the beginning the capacity to reflect on its own functioning as a team. That is, it has been able to distinguish those aspects that needed to be changed and has made improvement decisions and personal and group commitments.

At the same time, we believe that one of the elements that has most marked the development of this factor from the outset is the Team Notebook tool. That is, the work performed has been recorded on paper, and whether the objectives have been achieved or not, individually and as a group.

However, the task of a cooperative work team implies, among other things, collaboration in the group, decision-making, individual responsibility, respecting the speaking turn of classmates, communication, resolving conflicts that may arise while performing these tasks. That is, the development of social skills (some related to feelings, others to the ability to cooperate, debate, or plan) is essential. In fact, social skills are behaviors that allow a person to act with basic respect if teamwork and cooperation are desired. Comfortably expressing their feelings, arguments, and opinions, exercising personal rights without denying the rights of others. Throughout the execution of the different tasks proposed in the cooperative units, situations arose in which students had to overcome and express their insecurity, ask for help, etc. Therefore, the results obtained demonstrate that in the third year, these skills were developed at a general level and by all teams, achieving a score of 4.50 (high), and in the second year, it was 4.29 (also high). What is quite evident is that no one is born with social skills, but rather they are learned. In addition, social skills are important to favor the rest of the factors, not only the factors but also for improving academic performance. But we will talk about this later in the section on final results.

In conclusion, it is evident that cooperative work has favored the development of social skills, face-to-face interaction, and self-assessment. The factors that have progressed the most in relation to the fourth year are the interdependence of goals, roles, and tasks.

According to the standard that would have been set in the analysis of the Degree of Cooperativeness, the results obtained, as we have just seen, demonstrate that in the learning structure introduced in the classroom with the application of the CA/AC Program (some more evident than others) can be attributed to having introduced a cooperative learning structure in the classroom. Although we cannot say that the final degree of cooperativeness achieved is  $>4$ , very high, as explicitly stated in the standard set, we can affirm that it has been high, since at the end of the experience, it was 3.22. There has also been an improvement compared to the first experience where it was 2.82, which was acceptable.

During the first year, the group's tutor expressed:

"Despite using cooperative learning, students usually interact with the same classmates, both for completing tasks and for in-class work."

When asked if there are students who have never worked together, she commented:

"Yes, because the groups are formed by themselves, as sometimes they also have to work on assignments outside of school, and it works better for them to organize themselves."

She was also asked about situations where conflicts may arise within these teams, and she said:

"Problems arise if someone doesn't finish their work, or if one person dominates the others..."

Regarding the roles of students with difficulties, she expressed:

"Sometimes they feel excluded because only their performance is taken into account, and since most of them are newcomers, they end up forming their own group."

Regarding the planning of students with barriers to their presence, participation, and progress, she explained that she primarily relies on the support of the specialist who enters the classroom:

"The tutor, but if there is a student with special needs, the specialist also helps. Sometimes we lack time to coordinate everything."

The conclusions drawn from these findings suggest that for the development of the CA/AC program in the second year, some aspects of the program, such as heterogeneous groups chosen by the tutor, improving the cohesion of all students, and clarifying and assessing roles and responsibilities, should be adjusted. After these adjustments were made in the second year, the tutor was interviewed again and expressed the following:

"They ask for help from each other."

"The implementation of cooperative learning corrects negative attitudes, and therefore, the classroom climate is more pleasant."

"Roles and responsibilities have allowed for more motivation in the classroom because students worked in a different way than usual, they could have dialogue and express their own opinions. Furthermore, the result of the activity was individual and not collective, which meant that the opinions and contributions of students were valued more."

"Students have been more receptive, and there have been relationships of camaraderie and friendship."

“Students are capable of describing improvement goals for themselves, although they tend to rate themselves very well.”

According to the tutor, students have learned cooperative learning as both a resource and content; they have learned to wait, help each other, and explain tasks:

“There is more participation from students who were initially hesitant about teamwork.”

“Students with special educational needs have improved in terms of their autonomy in work. They are also more aware of the processes involved in their own learning because they have to reflect on their attitudes, and this makes their learning more meaningful.”

“They perceive the experience as the application of a dynamic model through communication and interaction processes. They believe it has allowed students to learn from their peers, listen to different viewpoints, and distribute roles... They have observed that group organization is based on mutual effort and joint problem-solving.”

“They have noticed that students reach agreements quickly. They organize themselves in some groups with their own working methods to assess the level of effort of each team member.”

“Students work cooperatively within their group and also with others. They share materials and pass on information”.

## Discussion

The discussion we have based on the results is as follows:

- We have observed that the factor of time should not be given too much consideration when carrying out an activity, as the team is composed of members with various learning styles and rhythms, and from a cooperative learning structure, the participation and execution time of all students must be respected, whether they are faster or slower. Therefore, we are interested in the quality of learning rather than quantity. In an individual learning structure, the teacher who wants all students to progress also needs more time than would be necessary if they adjusted to the pace of those who learn more quickly.
- Cooperative learning is a key and fundamental methodology for group awareness. Without group cohesion, there is no good classroom climate or positive interaction (Johnson et al., 1999), and student participation is very limited, thus denying learning opportunities, which affects academic performance.
- This methodology, if developed in an appropriate way – if all the factors that make teamwork of quality are present – improves students’ motivation towards learning (Cañabate & Colomer, 2020; Shpeizer, 2019).
- The cooperative learning structure prioritizes peer support as a basic pillar in the teaching and learning process.

- The cooperative learning structure can be applied to any area and teaching unit. Depending on the objective and purpose pursued, it may be more appropriate to use one structure or technique over another, but this does not mean that learning cannot be structured cooperatively.
- This method represents a change for teachers. Therefore, we believe that it will be successful if the teacher is willing to do so; if they are receptive to this new way of understanding the students' learning process. It implies a shift towards an inclusive vision of school, in which the student, whatever their personal characteristics, constructs their own learning based on their contributions and those of the rest of their classmates (Gaudet et al., 2010; Johnson et al., 2014; Poort et al., 2023).
- Some important cognitive and interpersonal activities can only occur when the student promotes the learning of the other group members, explaining orally how to solve a problem, analyzing the concepts they are studying, which means explaining what each one knows about a certain issue and connecting present learning with the past. Communication between students, this exchange of ideas, fosters discussion and contrasting opinions and can lead to the emergence of cognitive conflicts that can lead the student to a conceptual change, correcting their previous misconceptions (Gillies 2003a, 2003b, 2004, 2006, 2007).
- Students participating in a cooperative group cannot be put together and told, "work cooperatively!" Cooperative learning requires students to also learn interpersonal and group skills necessary to function as part of a team (Juárez et al., 2019). They will have to make decisions, resolve conflicts, negotiate... Teachers will have to teach them these group and interpersonal skills. Cooperation is not innate; it is learned. And the elements of Domain C of the CA/AC Program are an effective tool for teaching these skills.
- Group members (and teachers) must assess to what extent they have achieved their goals, which actions of group members are positive or negative, and make the corresponding decisions to improve cooperative group work. For the learning process to improve, reflection by group members is necessary to analyze how they are working together and how they can increase the group's effectiveness. In this sense, the tools developed to check the degree of cooperativeness are also a good tool for this reflection (Marin-García et al., 2008; Martínez-Gómez & Marín-García, 2009).

In our opinion, the main contribution of this research has been the definition of the Degree of Cooperativeness of a team and a class group, as well as the development of the necessary tools to determine it (questionnaires and calculation sheet to determine the Quality Index of teamwork and the degree of cooperativeness). The application of these tools for the first time in this research has allowed us to verify their usefulness and effectiveness in discriminating between different teams and groups in terms of cooperativeness.

## References

- Abellán, C. (2019). Aprendizaje cooperativo y formación del profesorado: de la teoría a la práctica escolar. *Revista De educación*, 42, 243-261.
- Ainscow, M. & Booth, T. (2000). Índice de Inclusión. Desarrollando el aprendizaje y la participación en escuelas. Centro de Estudios en Educación Inclusiva.
- Alghamdi, R. & Gillies, R. (2013). The impact of cooperative learning in comparison to traditional learning (small groups) on EFL learners' outcomes when learning English as a foreign language. *Asian Social Science*, 9(13), 19.



- Baloche, L. & Brody, C. (2017) Cooperative learning: exploring challenges, crafting innovations, *Journal of Education for Teaching*, 43(3), 274-283, DOI: 10.1080/02607476.2017.1319513
- Buchs, C. & Butera, F. (2015). Cooperative learning and social skills development. In R. Gillies (Eds.). *Collaborative Learning: Developments in research and practice*. (pp. 201-238). Nova Science Publishers.
- Colomer, J., Serra, T., Cañabate, D. & Bubnys, R. (2020). Reflective learning in higher education: Active methodologies for transformative practices. *Sustainability*, 12(9), 3827.
- Dillenbourg, P. (1999). What do you mean by 'collaborative learning'? In Dillenbourg, P. (Ed.). *Collaborative Learning: Cognitive and Computational Approaches*. Enseñando administración de empresas con docencia basada en el trabajo en equipo de los estudiantes: ventajas, inconvenientes y propuestas de actuación. *Intangible Capital*, 4(2), 143-165.
- Gaudet, A. D., Ramer, L. M., Nakonechny, J., Cragg, J. J., & Ramer, M. S. (2010). Small-group learning in an upper-level university biology class enhances academic performance and student attitudes toward group work. *PLoS One*, 5(12), 1-10. <https://doi.org/10.1371/journal.pone.0015821>
- Gillies, R. M. (2003a). The behaviors, interactions, and perceptions of junior high school students during small-group learning. *Journal of Educational Psychology*, 95, 137-147.
- Gillies, R. M. (2003b). Structuring cooperative group work in classrooms. *International Journal of Educational Research*, 39, 35-49.
- Gillies, R. M. (2004). The effects of cooperative learning on junior high school students during small group learning. *Learning and Instruction*, 14, 197-213.
- Gillies, R. M. (2006). Teachers' and students' verbal behaviours during cooperative and smallgroup learning. *British Journal of Educational Psychology*, 76, 271-287.
- Gillies, R. M. (2007). *Cooperative learning: Integrating theory and practice*. Sage.
- Gillies, R. M. (2014). Developments in cooperative learning: review of research. *Anales de Psicología*, 30(3), 792-801. <https://dx.doi.org/10.6018/analesps.30.3.201191>
- Johnson, D. W. & Johnson, R. T. (1997). Social skills for successful group work. *MAA notes*, 201-204.
- Johnson, D. W., Johnson, R. T. & Smith, K. A. (2014). Cooperative learning: Improving university instruction by basing practice on validated theory. *Journal on Excellence in University Teaching*, 25(4), 1-26.
- Johnson, D. W., Johnson, R. y Holubec, E. (2013). *Cooperation in the Classroom* (9 ed.). Book Company.
- Johnson, D., Johnson, R. & Holubec, E. (1999). *Los nuevos círculos de aprendizaje. La cooperación en el aula y la escuela*. Aique.
- Juárez, M., Rasskin, I. & Mendo, S. (2019). El aprendizaje cooperativo, una metodología activa para la educación del siglo XXI: Una revisión bibliográfica. *Revista Prisma Social*(26), 200-210. Retrieved from <https://dialnet.unirioja.es/descarga/articulo/7016662.pdf>
- Kagan, S. (1992). *Cooperative Learning*. Kagan Cooperative Learning.
- Marin-Garcia, J. A., Miralles-Insa, C., Garcia-Sabater, J. J. & Vidal-Carreras, P. I. (2008). Teaching management based on students' teamwork: Advantages, drawbacks and proposals for action. *Intangible Capital*, 4(2). 143-165. Retrieved from <https://www.intangiblecapital.org/index.php/ic/article/view/64/76>
- Martínez-Gómez, M. & Marin-Garcia, J.A. (2009). Como medir y guiar el cambio hacia entornos educativos universitarios más motivadores para los alumnos. *Formación Universitaria*, 2, 3-14.
- Onrubia, J. & Mayordomo, R. M. (2015). El aprendizaje cooperativo: elementos conceptuales. En, Onrubia J. y Mayordomo R.M. (Coords.), *El aprendizaje cooperativo*, 17-48. UOC.

- Poort, I., Jansen, E. & Hofman, A. (2023). Cultural intelligence and openness to experiences pave the way for cognitive engagement in intercultural group work. *Journal of Studies in International Education*, 27(2), 277-297.
- Pujolàs, P. (2008). *Nueve ideas clave*. El aprendizaje cooperativo. Graó.
- Pujolàs, P. (2009). La calidad en los equipos de aprendizaje cooperativo: algunas consideraciones para el cálculo del grado de cooperatividad, *Revista de Educación*, 349, 225-239.
- Rodríguez-Sandoval, E., Vargas-Solano E. & Luna-Cortés, J. (2010). Evaluación de la estrategia “aprendizaje basado en proyectos”. *Educación y Educadores*, 13(1), 13-25.
- Shpeizer, R. (2019). Towards a successful integration of project-based learning in higher education: Challenges, technologies and methods of implementation. *Universal Journal of Educational Research*, 7(8), 1765-1771.
- Slavin, R. (2014). Cooperative Learning and Academic Achievement: Why does group-work work?, *Anales de Psicología*, 30(3), 785-791.
- Stake, R. E. (1995). *The Art of Case Study Research*. SAGE Publications.
- Thurston, A., Topping, K, Tolmie, A., Christie, D., Karagiannidou, E. & Murray, P. (2010). Cooperative Learning in Science: Follow-up from primary to high school. *International Journal of Science Education*. 32. DOI: 10.1080/0950069090272167

